



**Draft
Environmental Assessment**

**Road Hollow
Gas Plant Project**

March 1983



**Department of the Interior
Bureau of Land Management
Kemmerer Resource Area
Kemmerer, Wyoming**



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Kemmerer Resource Area Office
P.O. Box 632
Kemmerer, Wyoming 83101

IN REPLY
REFER TO:
1791 (470)

To Reader:

The goal of the environmental analysis process is to ensure that environmental information is available to public officials and citizens before decisions on a particular proposal are made and before actions on that proposal are taken. The environmental analysis process is intended to help all public officials: (1) make decisions that are based on an understanding of the environmental consequences of the alternatives including the proposed action; (2) take actions that assure the protection, restoration, and/or enhancement of the affected environment; and (3) to document the analysis process and subsequent decision(s) for public review.

The draft environmental assessment (DEA) documents the analysis of the probable environmental impacts that would be associated with Exxon Company, U.S.A.'s proposed Road Hollow Project in Lincoln County, Wyoming. The DEA assesses the proposed gas treatment plant and related ancillary facilities. Issuance of rights-of-way by the Bureau of Land Management (BLM) are needed for the construction, operation, and maintenance of the proposed project. The National Environmental Policy Act (NEPA) of 1969 as amended (43 U.S.C. 4321 et seq.) requires that all programs and activities affecting the land and resources under BLM jurisdiction be analyzed for probable environmental impacts. Subsequent Council on Environmental Quality (CEQ) regulations for Section 102 of NEPA require federal agencies to consider projects as a whole, even when certain portions of those projects involve non-federal land and resources (40 Code of Federal Regulations (CFR) 1508.7).

Written comments concerning the draft will be accepted until May 10, 1983. Comments should be addressed to Steve Howard, Kemmerer Resource Area Manager, Bureau of Land Management, P.O. Box 632, Kemmerer, Wyoming 83101.

Sincerely yours,



Kemmerer Area Manager

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DRAFT
ENVIRONMENTAL ASSESSMENT
WY-042-EA83-40

ROAD HOLLOW
GAS PLANT PROJECT
IN
LINCOLN AND UINTA COUNTIES, WYOMING

Prepared by
BUREAU OF LAND MANAGEMENT (LEAD AGENCY)
AND WOODWARD-CLYDE CONSULTANTS

March 1983

CONTENTS

		<u>Page</u>
	SUMMARY	1
<u>Chapter</u>		
1	DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION	1-1
	BACKGROUND	1-1
	PURPOSE AND NEED FOR PROPOSED ACTION	1-1
	DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION	1-2
	PROPOSED ACTION	1-2
	Project Components	1-2
	Construction, Operation, Maintenance, and Abandonment Procedures	1-15
	Applicant Committed Practices	1-24
	ALTERNATIVES	1-28
	No-Action Alternative	1-28
	Project Components	1-28
	Mitigation Alternatives	1-32
	Construction, Operation, Maintenance, and Abandonment Procedures	1-32
	Applicant Committed Practices	1-32
	AUTHORIZING ACTIONS	1-32
	FEDERAL	1-33
	STATE	1-34
	LOCAL JURISDICTIONS	1-35
	SCOPE OF ANALYSIS	1-35
	GEOGRAPHIC AREA OF INFLUENCE	1-35
	IMPACT ANALYSIS GUIDELINES	1-35
	RELATIONSHIP TO OTHER DOCUMENTS	1-36

<u>Chapter</u>		<u>Page</u>
	SUMMARY AND COMPARISON OF IMPACTS FOR ALTERNATIVES INCLUDING THE PROPOSED ACTION	1-36
	MITIGATION MEASURES NOT INCLUDED IN THE PROPOSED ACTION, ALTERNATIVES, OR APPLICANT-COMMITTED PRACTICES	1-39
2	AFFECTED ENVIRONMENT	2-1
	CLIMATE, AIR QUALITY, AND NOISE	2-1
	GEOLOGY AND MINERALS	2-5
	PALEONTOLOGICAL RESOURCES	2-6
	SOILS	2-10
	WATER RESOURCES	2-10
	VEGETATION	2-11
	WILDLIFE	2-14
	AQUATIC ECOLOGY	2-17
	LIVESTOCK AND RANGE	2-22
	CULTURAL RESOURCES	2-25
	VISUAL RESOURCES	2-35
	TRANSPORTATION	2-36
	RECREATION RESOURCES	2-37
	SOCIOECONOMIC CONDITIONS	2-38
3	ENVIRONMENTAL CONSEQUENCES	3-1
	ENVIRONMENTAL IMPACTS	3-1
	CLIMATE, AIR QUALITY, AND NOISE	3-1
	GEOLOGY AND MINERALS	3-4
	PALEONTOLOGICAL RESOURCES	3-7
	SOILS	3-10
	WATER RESOURCES	3-11
	VEGETATION	3-14
	WILDLIFE	3-17
	AQUATIC ECOLOGY	3-19
	LIVESTOCK AND RANGE	3-20
	CULTURAL RESOURCES	3-22
	VISUAL RESOURCES	3-25
	TRANSPORTATION	3-25
	RECREATION RESOURCES	3-26
	SOCIOECONOMIC CONDITIONS	3-28
	LAND USE CONTROLS AND CONSTRAINTS	3-40
	HEALTH AND SAFETY	3-40
	ENERGY USE	3-42

<u>Chapter</u>		<u>Page</u>
	SUGGESTED MITIGATION	3-43
	UNAVOIDABLE ADVERSE IMPACTS	3-44
	RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY	3-45
	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES	3-46
4	CONSULTATION AND COORDINATION	4-1
	TEAM ORGANIZATION	4-1
	COORDINATION IN PREPARATION OF THE PROPOSED ACTION	4-1
	PUBLIC CONSULTATION AND COORDINATION	4-1
	PUBLIC PARTICIPATION	4-6
	LITERATURE CITED	L-1
	GLOSSARY	GL-1
<u>Appendix</u>		
A	PROJECTS CONSIDERED IN THE CUMULATIVE ANALYSIS	A-1
B	GEOLOGY	B-1
C	SOILS	C-1
D	VISUAL RESOURCES	D-1
E	RECREATION RESOURCES	E-1
F	WATER RESOURCES	F-1
G	DETAILED LOCATION MAP	G-1

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1-1 Land Status and Construction/Operational Acreages for Alternatives Including the Proposed Action	1-4
1-2 Estimated Total Work Force and Construction Schedule, Road Hollow: 1983-1986	1-11
1-3 Summary and Comparison of Impacts for Alternatives Including the Proposed Action	1-37
1-4 Crucial Wildlife Use Areas and Periods to Avoid During Construction of the Proposed Action or Alternatives	1-40
2-1 National and Wyoming State Ambient Air Quality Standards	2-3
2-2 Total Suspended Particulates	2-4
2-3 Concentrations of Sulfur Dioxide and Nitrogen Oxide Observed at Kemmerer, 1976-1978	2-4
2-4 Summary of Geology and Paleontology	2-8
2-5 Water Quantity and Quality Characteristics of Potentially Affected Streams	2-12
2-6 Distribution of Major Vegetation Types at the Proposed Plant Site and Within ROWs for Proposed and Alternative Linear Project Components	2-15
2-7 Location of Important Wildlife Habitats in Relation to Proposed and Alternative Project Facilities	2-18
2-8 Characteristics of Stream and River Habitats Potentially Affected by the Proposed Action and Alternatives	2-23

LIST OF TABLES (continued)

<u>Table</u>		<u>Page</u>
2-9	Occurrence of Fish Species in Stream and River Habitats Potentially Affected by the Proposed Action and Alternatives	2-24
2-10	AUM Data Summary for the Proposed Action	2-26
2-11	AUM Data Summary for the Alternative Project Components	2-27
2-12	Cultural Chronology of the Proposed Road Hollow Project Area	2-29
2-13	Summary Data of Prehistoric Cultural Resources Identified Within the Geographic Area of Influence	2-30
2-14	Summary Data of Historic Cultural Resources Identified Within the Geographic Area of Influence	2-33
2-15	Population Change, Lincoln County, Kemmerer, and Diamondville: 1950-1980	2-40
2-16	Population Projections, Kemmerer-Diamondville: 1982-1990	2-40
2-17	Employment, Total Payroll, and Average Weekly Wage by Industry by Place of Work, Kemmerer and Diamondville: 1981	2-41
2-18	Unemployment Rate and Average Annual Labor Force by Place of Residence, Wyoming and Lincoln County: 1972-1982	2-42
2-19	Total Employment by Industrial Sector, Lincoln County: 1980-1990	2-43
2-20	Estimated Housing Units by Type, Kemmerer: 1982	2-44
2-21	Housing Units by Type, Diamondville: 1973, 1975, 1977, and 1980	2-44

LIST OF TABLES (continued)

<u>Table</u>	<u>Page</u>
3-1 Emission Data for the 80 Million SCFD Gas Treatment Plant	3-3
3-2 Modeling Results for Sulfur Dioxide (80 Million SCFD Plant)	3-5
3-3 Project Components Exposed to Potential Geologic Hazards	3-8
3-4 Areas of Major Vegetation Types That Would be Disturbed During Construction of Proposed and Alternative Facilities	3-15
3-5 Estimated AUM Losses Attributable to Proposed Action in Cumberland/Uinta Grazing Allotment	3-21
3-6 Estimated AUM Losses Associated with Alternatives	3-23
3-7 Total Project-Related Jobs by Quarter, Kemmerer and Diamondville: 1983-1986	3-29
3-8 Estimated Population In-Migration Due to Proposed Action, Kemmerer and Diamondville: 1983-1986	3-30
3-9 Project-Related Population Compared to Projected Kemmerer-Diamondville Population: 1983-1986	3-31
3-10 Estimated Housing Demand Due to Proposed Action, Kemmerer and Diamondville: 1983-1986	3-32
3-11 Estimated Ad Valorem Revenues on Real Property, Road Hollow Project (Year Following Completion)	3-34
3-12 Estimated Ad Valorem Revenues on Mineral Production, Road Hollow Project: 1984 and 1986	3-35
3-13 Estimated Mineral Severance and Excise Taxes, Road Hollow Project: 1984 and 1986	3-35

LIST OF TABLES (concluded)

<u>Table</u>		<u>Page</u>
3-14	Net Changes in Baseline and Cumulative Project Work Forces: 1983-1986	3-37
3-15	Estimated Ad Valorem Revenues on Real Property, Road Hollow Alternatives (Year Following Completion)	3-39
3-16	Estimated Total Work Force Assuming Worst-Case Schedule, Road Hollow: 1983-1986	3-41
4-1	List of Preparers	4-2

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1-1 Simplified Sour Gas Treatment Process for a 40 Million SCFD Module	1-7
1-2 Gas Processing Plant Site Layout	1-10
1-3 Typical Pipeline Construction Spread	1-19
1-4 Typical Pipeline Construction Right-of-Way Cross-Section	1-20
1-5 Typical Access Road Construction	1-22
2-1 Important Wildlife Areas	2-21
3-1 Predicted Annual SO ₂ Concentration	3-6

LIST OF MAPS

<u>Map</u>	<u>Page</u>
1-1 General Location Map	1-3
1-2 General Location of Proposed and Alternative Project Components	1-8
1-3 Gas Gathering System and Proposed Transmission Line	1-13

SUMMARY

Exxon Company, U.S.A. (Exxon), proposes the construction and operation of a natural gas processing plant, transport, and support facilities. These facilities would produce and deliver approximately 22 billion cubic feet per year of pipeline-quality natural gas over a 20-year period. All major components of the proposed project would be necessary to recover and convert sour (containing hydrogen sulfide) well gas to a marketable product. The gas reserves that would be developed are located in southwestern Wyoming, approximately 20 air miles southwest of Kemmerer/Diamondville and 30 miles northeast of Evanston.

The Road Hollow project as proposed by Exxon would include construction of: approximately 11 miles of well gas gathering pipelines, one two-module centralized gas treatment plant, approximately 8 miles of sales gas pipeline, approximately 42 miles of other product (liquid hydrocarbons) pipelines, approximately 23 miles of an access and sulfur haul road, and approximately 2 miles of 138-kilovolt (kV) electric power line. These facilities would be built in order to process well gas containing hydrogen sulfide and to produce marketable natural gas, marketable liquid hydrocarbons, and elemental sulfur. The natural gas and liquid hydrocarbons would be delivered and sold to pipeline companies for shipment to markets, while elemental sulfur would be transported by truck.

During construction of the proposed project components, approximately 917 acres of public, state, and private lands

would be disturbed. It is estimated that 314 acres of public and private land would be occupied by these facilities during the project life of the proposed gas treatment plant. The entire proposed plant site, and portions of other proposed project facilities, would be located on public lands managed by the Bureau of Land Management (BLM), Kemmerer Resource Area. A Rights-of-Way (ROW) Application for the plant site and other related facilities involving public lands has been submitted by Exxon to the BLM Kemmerer Resource Area office.

The BLM Kemmerer Area office is responsible for preparation of this Environmental Assessment (EA) in accordance with provisions of the National Environmental Policy Act (NEPA) and regulations of the Council on Environmental Quality (CEQ). The purpose of the EA is to address potential impacts that would result from the applicant's proposed action and other alternatives identified. A public scoping meeting was held for the purpose of identifying issues and concerns for the EA.

Alternatives to the proposed action that were identified consisted mainly of other routes for transportation of marketable products. Alternatives other than route alternatives included a different technology for removing hydrogen sulfide from well gas and use of surface water from Woodruff Narrows rather than ground water from proposed wells. The no action alternative was defined as the proposed gas treatment plant and ancillary facilities not being constructed.

Evaluation of potential impacts was based on the description of the proposed action and alternatives, including implementation of impact-reducing procedures for construction, operation, maintenance, and abandonment and special applicant-committed practices to further reduce impacts for specific resource considerations. Inclusion of these applicant-proposed practices, in part, accounts for the low number, magnitude, and duration of environmental impacts associated with this proposed project.

Impacts were identified and assessed based on indicators of significance defined for each resource topic. This EA focuses on those impacts with the most potential for approaching these indicators of significance. Other less important impacts were identified but were given less emphasis. Technical reports were prepared for two resource topics (wildlife and socioeconomics) for which the largest number and magnitude of impacts were expected. The major findings of the impact analysis for those resources considered sensitive to project activities are given below.

AIR QUALITY

Operation of the proposed plant facilities would not cause violation of any applicable air quality standards and would be too low to result in any appreciable cumulative impacts when combined with emissions from other nearby gas processing plants. Annual SO₂ concentrations in µg/m³ would be less than 0.05 at distances greater than 8 miles from the proposed plant site.

GEOLOGY

The recurrence interval for a maximum magnitude (Ms) 6-1/2 to 7 earthquake in the area of influence is on the order of several hundred to two thousand years. An earthquake of this magnitude could

damage proposed or alternative facilities.

PALEONTOLOGY

The potential for impacts to significant fossils within highly sensitive geologic units is small, given the implementation of the management plan committed to by the applicant.

WATER RESOURCES

No significant water resource impacts would result from the proposed action or alternatives. Annual average water supply requirements of 32 acre-feet (20 gallons per minute) would not be expected to significantly impact ground-water or surface-water supplies in the region.

VEGETATION

The area of each vegetation type that would be disturbed by proposed or alternative project components compared with the total area of the type in the geographic area of influence would be low (maximum 1.6 percent). The proposed access and sulfur haul road would result in the largest number of acres disturbed.

WILDLIFE

Clearing of areas for construction of proposed or alternative project components would not result in significant losses of important wildlife habitat. Human presence and activity would not significantly disturb crucial wildlife use areas due to stipulation of construction avoidance dates and other provisions in the standard BLM Wyoming ROW grant stipulations. No significant cumulative impacts would result from important wildlife habitat loss. Cumulative disturbances resulting from increased human presence--e.g., road kills, poaching, overcrowding of displaced animals--may

result, but cannot be quantified. No threatened or endangered species would be adversely affected.

LIVESTOCK AND RANGE

Construction of the proposed action would result in short-term loss of about 100 animal unit months (AUM), compared to 66,000 AUMs available within the regional grazing allotment. Long-term loss of AUMs would be minimal. If the proposed access and haul road is not constructed, short-term and long-term loss of AUMs would decrease substantially. The Road Hollow project would increase the long-term cumulative loss of AUMs from 2.01 percent of AUMs available in the Cumberland/Uinta allotment to 2.06 percent.

CULTURAL RESOURCES

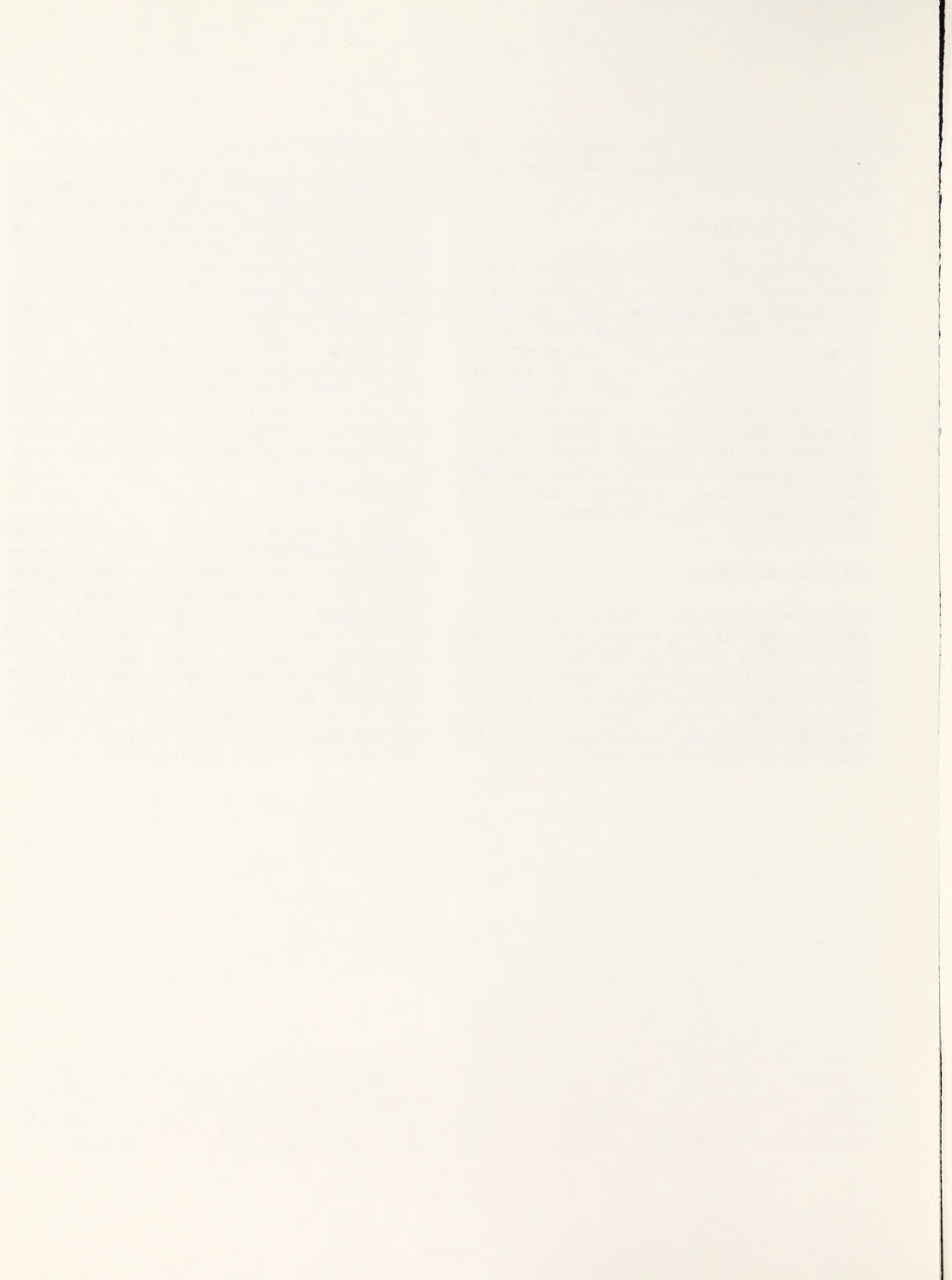
No known cultural resources (including variants of the Oregon Trail) should be adversely affected by the proposed action or alternatives, assuming the implementation of procedures and methods to be specified in the cultural resources management plan and implementation of the applicant-committed practices.

VISUAL RESOURCES

Visual contrasts in color, texture, and line would result from road and pipeline construction where proposed or alternative ROWs cross corridors identified as the Oregon Trail. These contrasts would be sensitive in locations where trail ruts are clearly visible and interpretive markers have been placed for public reference--e.g., along portions of the proposed eastern access and sulfur haul road. Visual impacts would not be significant because of stipulated reclamation requirements and other applicant-committed mitigative measures.

SOCIOECONOMICS

The proposed project and associated construction work force would increase the population of affected communities, which in turn would increase demands on public services (including school districts) and demand on temporary and permanent housing. These impacts would not be significant, based on applicant-committed practices, including development of a housing plan and monitoring of and assistance to social service agencies and affected school districts.



Chapter 1

DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

BACKGROUND

The proposed Road Hollow gas plant project would be located within an area of southwestern Wyoming known as the Overthrust Belt. The Overthrust Belt is considered one of the United States' most important future sources of oil and gas. Current Overthrust Belt production is modest, and although oil and gas production have increased recently, much of the known resource remains underground (Wyoming Department of Administration and Fiscal Control 1981; Wyoming Legislative Service Office 1982) with facilities just recently being constructed for collection, processing, and transportation.

The natural gas for Exxon's proposed Road Hollow project would be produced initially from the Big Horn Formation at depths of up to 16,000 feet. Additional potential reserves may be found in shallower formations. These formations produce natural gas containing toxic and corrosive hydrogen sulfide (H_2S) gas, which must be processed before the gas from wells can be marketed. It is anticipated that the natural gas reserves within the Road Hollow unit can be developed from a total of 8-9 wells spaced approximately 1 mile apart.

The entire proposed plant site, and portions of other proposed project facilities, would be located on public lands managed by the Bureau of Land Management (BLM), Kemmerer Resource Area. A Rights-of-Way (ROW) Application has been submitted by Exxon to the BLM Kemmerer

Resource Area office for the plant site and other related facilities, including gas gathering lines, access roads, and power transmission lines involving public lands. The purpose of the Road Hollow Gas Plant Project Environmental Assessment (EA) is to address the potential environmental (including socioeconomic) impacts that would result from the applicant's proposed action. This evaluation of impacts supplements a previous BLM EA (BLM 1979) that addressed environmental impacts of oil and gas leasing programs on a regional basis for the Kemmerer Resource Area.

PURPOSE OF AND NEED FOR PROPOSED ACTION

The purpose of the proposed Road Hollow natural gas processing plant and transport and support facilities is to process and supply approximately 22 billion cubic feet (bcf) of pipeline-quality natural gas per year, 2044 thousand barrels (bbls)/yr of natural gas liquids (NGL), and 1680 thousand bbls/yr of condensate when the plant is operated at rated capacity. The proposed processing plant is needed in order to produce the pipeline-quality gas and to separate out of this gas the associated liquid hydrocarbons and H_2S .

Although the deep recession in late 1981 and 1982 and the record drilling activity and discoveries in 1981 have resulted in current producible reserves exceeding current demand, the trend toward declining production begun in 1973, when total U.S. gas production

peaked at 22,000 bcf/yr, is expected to continue. By the year 1990, production is expected to drop to 15,100 bcf/yr and by the year 2000 to 13,000 bcf/yr. Approximately 30 percent of production in 1990 (4000 bcf/year) and almost half in 2000 (6200 bcf/year) must come from reserves yet to be discovered and produced.

All major components of the proposed project, including the producing wells, sour gas gathering system, and sour gas treatment plants, are necessary to recover and convert the sour, high-Btu natural gas to a marketable product. If these reserves are not produced, they would remain unavailable as a major domestic source of natural gas over the approximate 20-year life of the project. If the reserves are produced, they would contribute to the reduction of this country's dependence upon uncertain foreign supply, and would contribute to the reduction of this nation's balance-of-payments deficit.

DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

PROPOSED ACTION

Exxon Company, U.S.A., proposes to develop and produce sour, high-Btu natural gas reserves located in Lincoln County, Wyoming, approximately 20 air miles southwest of Kemmerer/Diamondville and 30 air miles northeast of Evanston (Map 1-1). For this EA, Exxon's Road Hollow project would include sour gas collection at the wellheads and transport via gathering pipelines, one two-module centralized gas treating plant to treat the sour gas and produce pipeline-quality natural gas, elemental sulfur and stabilized condensate and natural gas liquids product transport systems, access roads, and related facilities.

The Road Hollow project components would be located on public, state, and private land. Table 1-1 lists the proposed facilities, status of the lands

involved, and the area which would be involved during construction and operation of project facilities.

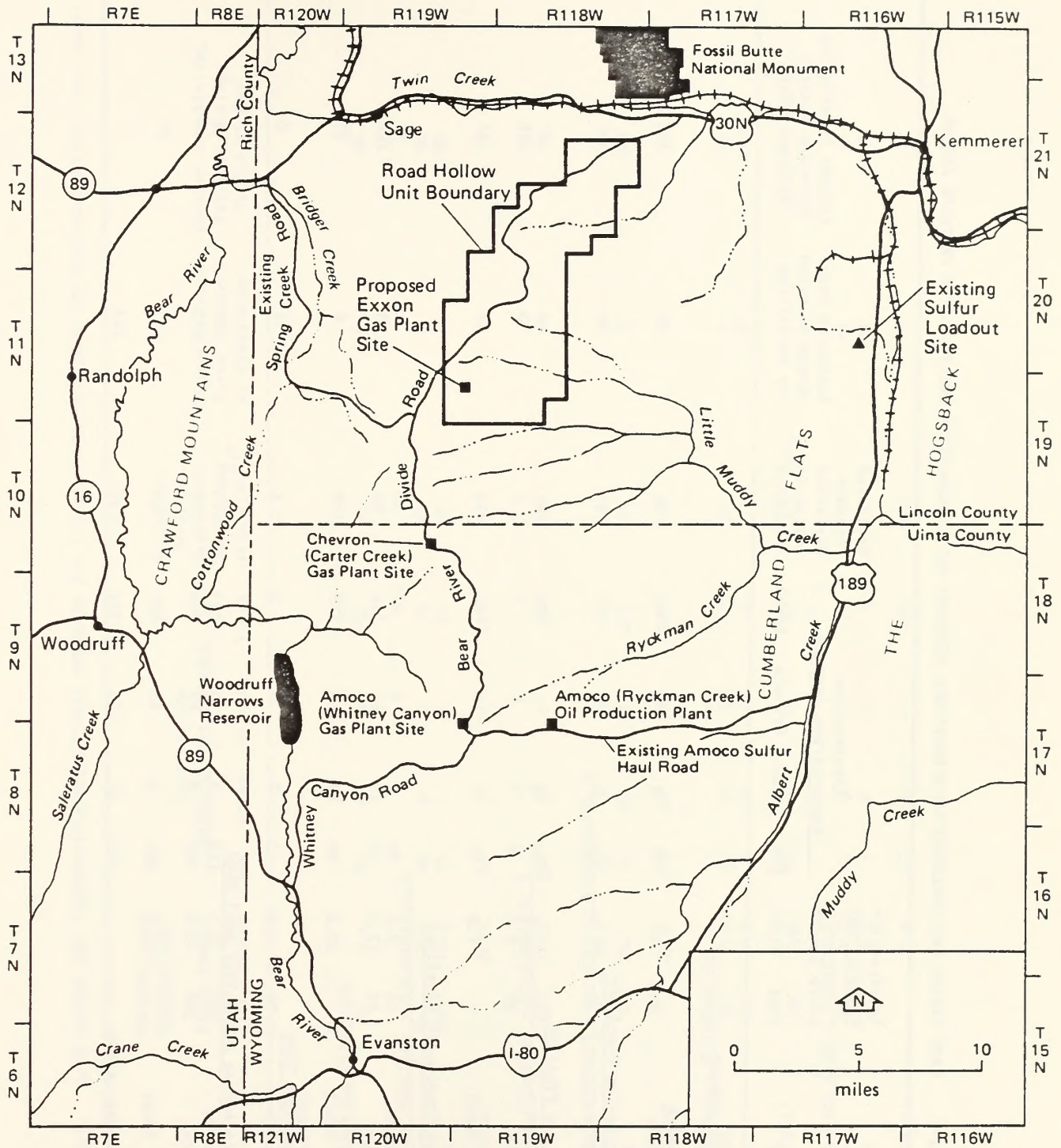
Project Components

Gas Treatment Plant. Two gas treating modules, each with a capacity of 40 million standard cubic feet per day (scfd), are proposed. Each module would produce pipeline-quality natural gas by treating sour natural gas collected from wells. This process would produce by-products of elemental sulfur and liquid hydrocarbons. The estimated amount of products and releases from the two gas treating modules include 62 million scfd of natural gas for sale, 3.2 million scfd of fuel gas for plant use, 34 long tons per day of sulfur for sale, 5600 and 4602 barrels per day, respectively, of NGL and condensate for sale, and approximately 49 tons per year of sulfur compounds released to the atmosphere from the tail gas stack. An overall process diagram is presented in Figure 1-1.

A summary of the plant operations that would be needed to produce salable products includes:

- Physical separation of liquids (liquid hydrocarbons and water) from gas
- Stabilization of hydrocarbon liquids
- Natural gas liquids recovery
- Removal of acid gas (H_2S and CO_2 [carbon dioxide]) from the gas stream
- Removal of water from sweetened gas and production of pipeline-quality sales gas
- Conversion of acid gas into elemental sulfur
- Treatment of tail gas to reduce sulfur emissions

The 40-acre plant site would be entirely on public lands on a plateau (less than 5 percent slope) of the Bear River Divide at approximately 7900 feet elevation. The proposed location for the gas treating plant is in Section 5, T19N, R119W (Map 1-2). The plant would be constructed with an initial processing



Map. 1-1. GENERAL LOCATION MAP

Table 1-1. LAND STATUS AND CONSTRUCTION/OPERATIONAL ACREAGES FOR ALTERNATIVES INCLUDING THE PROPOSED ACTION

County	Construction Right-of-Way		Construction Right-of-Way Acreage				Estimated Acreage Disturbed During Construction ^{a,b}	Estimated Total Acres Occupied by Facilities	Percent Paralleling Existing Utility Rights-of-Way ^a
	Width in Feet	Length in Miles	BLM	Right-of-Way Acreage		Total			
				State	Private				
PROPOSED ACTION									
Plant Site	NA	NA	40	0	0	40	40	40	NA
Gas Gathering Pipelines									
Lincoln	50	11.0	67	0	0	67	55	0	0
Sales Gas Pipeline									
Lincoln	50	7.1	40	0	3	43	17	0	86
Uinta	50	0.7	2	0	1	3	2	0	100
Total		7.8	42	0	4	46	19	0	87
NGL and Condensate Pipelines									
Lincoln	70	7.1	56	0	4	60	34	0	86
Uinta	70	13.7	42	10	64	116	66	0	100
Total		20.8	98	10	68	176	100	0	95
Transmission Line									
Lincoln	20	2.0	5	0	0	5	1	<1	0
Eastern Access and Sulfur Haul Road									
Lincoln	300	3.1	113	0	0	113	113	38	61
Uinta	200	19.4	387	0	83	470	470	235	10
Total		22.5	500	0	83	583	583	273	17
TOTAL ACRES			752	10	155	917	798	314	

Table 1-1. LAND STATUS AND CONSTRUCTION/OPERATIONAL ACRES FOR ALTERNATIVES INCLUDING THE PROPOSED ACTION (continued)

County	Construction Right-of-Way		Construction Right-of-Way Acreage				Estimated Acreage Disturbed During Construction ^{a,b}	Estimated Total Acres Occupied by Facilities	Percent Paralleling Existing Utility Rights-of-Way ^a
	Width in Feet	Length in Miles	BLM	State	Private	Total			
ALTERNATIVES									
Gas Gathering Pipelines ^c									
Lincoln	50	9.4	57	0	0	57	45	0	40
Sales Gas Pipeline - Alternative 1									
Lincoln	50	7.1	40	0	3	43	17	0	86
Uinta	50	10.4	23	6	34	63	25	0	100
Total		17.5	63	6	37	106	42	0	94
Sales Gas Pipeline - Alternative 2									
Lincoln	50	17.5	100	0	6	106	42	0	94
NGL and Condensate Pipelines - Alternative 1									
Lincoln	70	7.1	56	0	4	60	34	0	86
Uinta	70	26.7	76	20	131	227	129	0	100
Total		33.8	132	20	135	287	163	0	97
Water Supply - Alternative 1									
Lincoln	50	7.1	40	0	3	43	17	0	86
Uinta	50	0.7	2	0	1	3	2	0	100
Total		7.8	42	0	4	46	19	0	87
Transmission Line - Alternative 1									
Lincoln	20	7.2	16	0	1	17	17	<1	27
Uinta	20	0.2	1	0	0	1	1	<1	0
Total		7.4	17	0	1	18	18	1	27

Table 1-1. LAND STATUS AND CONSTRUCTION/OPERATIONAL ACRES FOR ALTERNATIVES INCLUDING THE PROPOSED ACTION (concluded)

County	Construction Right-of-Way		Construction Right-of-Way Acreage			Estimated Acreage Disturbed During Construction ^{a,b}	Estimated Total Acres Occupied by Facilities	Percent Paralleling Existing Utility Rights-of-Way ^a	
	Width in Feet	Length in Miles	BLM	State	Private				Total
ALTERNATIVES (continued)									
Alternative Access and Sulfur Haul Road									
Lincoln	100	7.2	85	0	2	87	87	27	
Uinta	100	0.2	2	0	0	2	2	0	
Total		7.4	87	0	2	89	89	27	

Note: Acreage numbers were generally rounded to the nearest whole number.

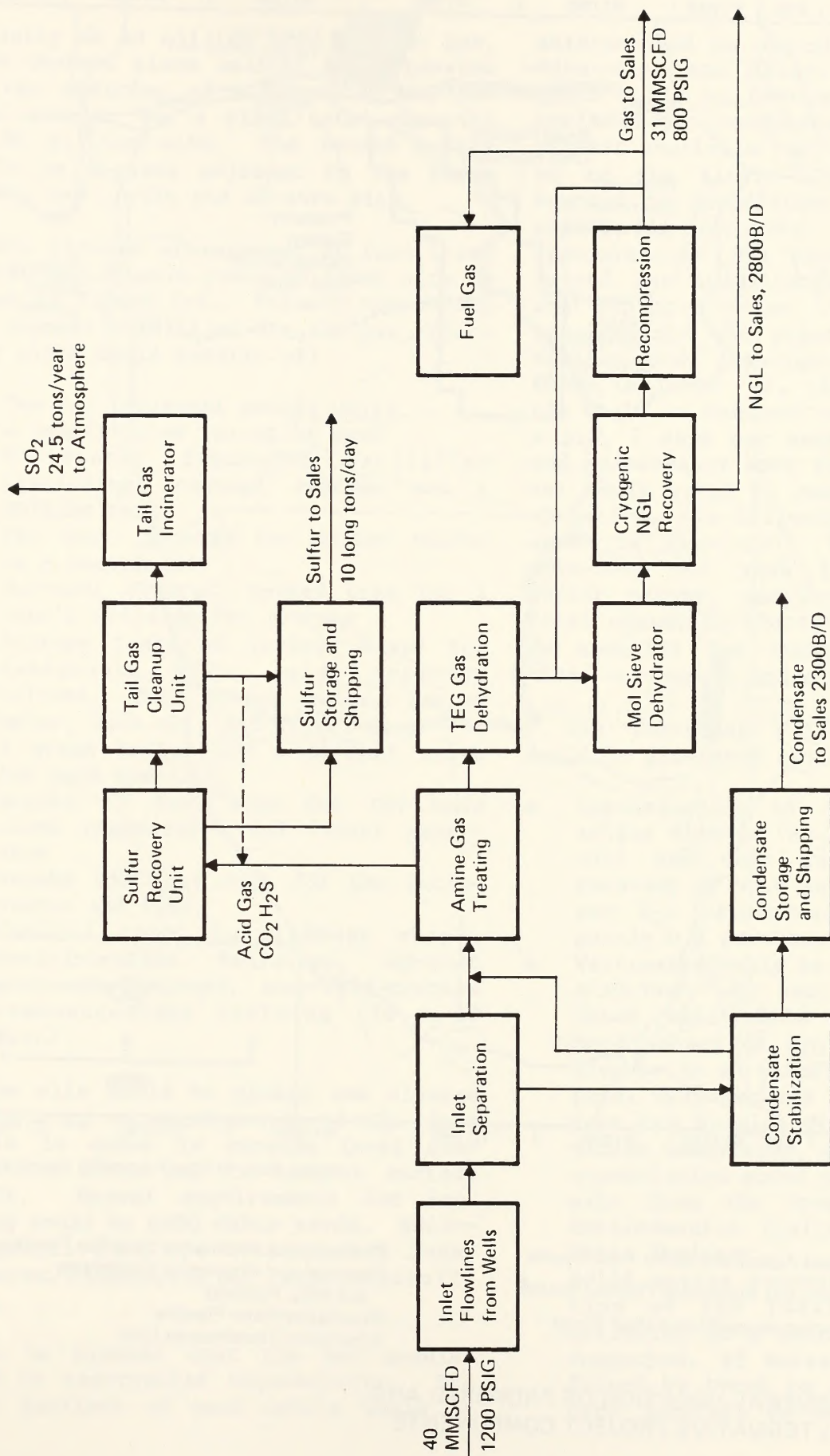
NA = Not Applicable.

U = Unknown.

^aAssumes NW - Bear River Divide Trunk A Pipeline would be constructed prior to construction of the Road Hollow project.

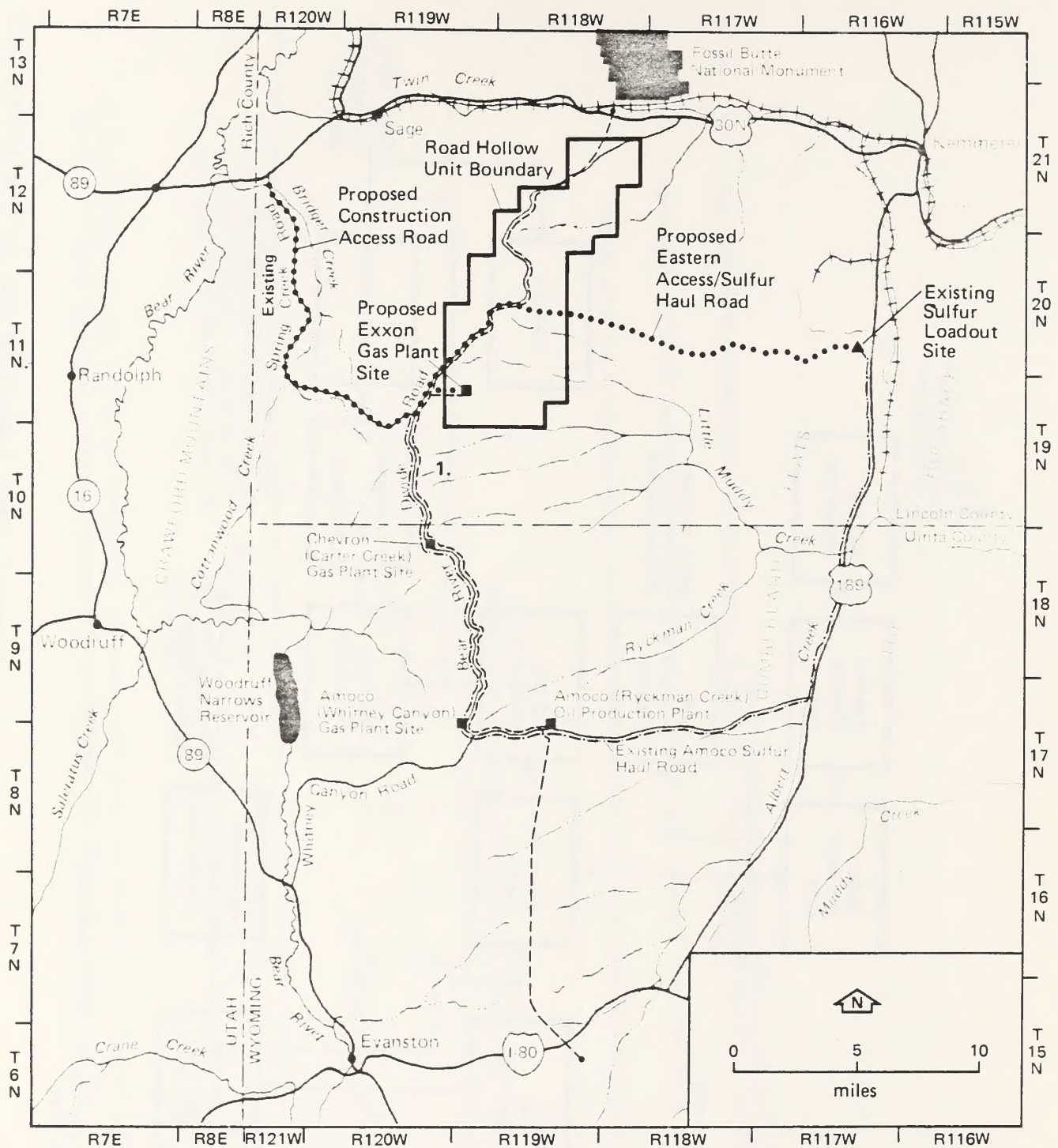
^bOnly includes new disturbance (i.e., acreage does not include workspace overlap with other recently constructed utility rights-of-way).

^cOnly four alternative gas gathering pipelines were identified for analysis in this Environmental Assessment (EA) (i.e., numbers should not be compared against proposed action).



Note: All numbers are preliminary and may be changed during detailed design.

Figure 1-1. SIMPLIFIED SOUR GAS TREATMENT PROCESS FOR A 40 MILLION SCFD MODULE



Note: Refer to Maps 1-3 and G-1 for more detail.

LEGEND

- Proposed Access and Sulfur Haul Routes
- Proposed and Alternative Pipeline Routes
- - - - - Alternative Access/Sulfur Haul Route
- 1. Proposed and Alternative Sales Gas Pipelines
- Proposed and Alternative Condensate and NGL Pipelines
- Alternative Water Pipeline
- Alternative Transmission Line

Map 1-2. GENERAL LOCATION OF PROPOSED AND ALTERNATIVE PROJECT COMPONENTS

capacity of 40 million scfd of sour gas, with current plans calling for expansion by the addition of a second 40 million scfd module, for a plant total capacity of 80 million scfd. The second module would be located adjacent to the first module and within the 40-acre site.

The planned arrangement of facilities within the 40-acre proposed plant site is shown in Figure 1-2. Primary components and support facilities for the gas treatment plant would consist of:

- Two gas treatment module units
- A runoff water retention pond
- Wastewater treatment facilities (including drainage systems and a holding tank)
- Ten days' storage for molten sulfur in a heated pit
- One-acre cleared, bermed area for 1 year's solid sulfur storage
- Storage tanks of various sizes for condensate, NGL, amine treating solvent, TEG, makeup water, wastewater, lube oil, and diesel fuel
- A steam boiler and a 45-foot stack for each module
- Stacks 45 feet high for the mole sieve regenerator and diesel generator
- Stacks 150 feet high for the incinerator and flare
- Control room, maintenance shops, administrative buildings, 40-foot microwave antenna, and skid-mounted communications building (50 x 50 feet)

The site would be graded and cleared at the start of construction of the first module in order to provide level construction areas and to control surface runoff. Gravel requirements for surfacing would be 6400 cubic yards. Existing gravel pits are located near Sage, Kemmerer/Diamondville, and Woodruff, Utah.

It is planned that the two modules would be constructed sequentially. The major portions of each module would be

skid-mounted to minimize field construction time and labor. This means the skids would be fabricated in a contractor's shop, transported by rail to the closest available rail siding, and trucked to the site. They would then be mounted on foundations and the required piping tie-ins made. A work force of approximately 110 people would be required for installation of the modules and piping tie-ins. Total work-force requirements and schedule for the processing and associated facilities are given in Table 1-2. Each treatment module would be designed to operate 24 hours a day, 7 days per week. The operations and maintenance work force for the project would total 31 people. During full operation, the following major resources would be required: water totaling 32 acre-feet per year for potable uses, boiler makeup, and process system; and total operating electrical demand of 5.6 MW annually for lighting, instrumentation, equipment, and other uses.

The following effluents and wastes would be generated at full operation:

- Approximately 49 tons per year of sulfur dioxide (SO_2), assuming a SCOT tail gas unit and overall sulfur recovery of 99.6 percent and wellhead gas H_2S concentrations of approximately 0.5 percent.
- Wastewater would be approximately 9.8 acre-feet per year (6 gpm). This water, which would contain H_2S , would be disposed of by subsurface injection or in an evaporation pond. Disposal well permits would be obtained from the Wyoming Oil and Gas Conservation Commission, and any wastewater accumulation ponds would require permits from the Wyoming Division of Environmental Quality (DEQ) and the State Engineer.
- Solid wastes generated during operation of the facilities would be collected in a centralized location, compacted, if necessary, and transferred by truck to an approved sanitary landfill or other solid waste

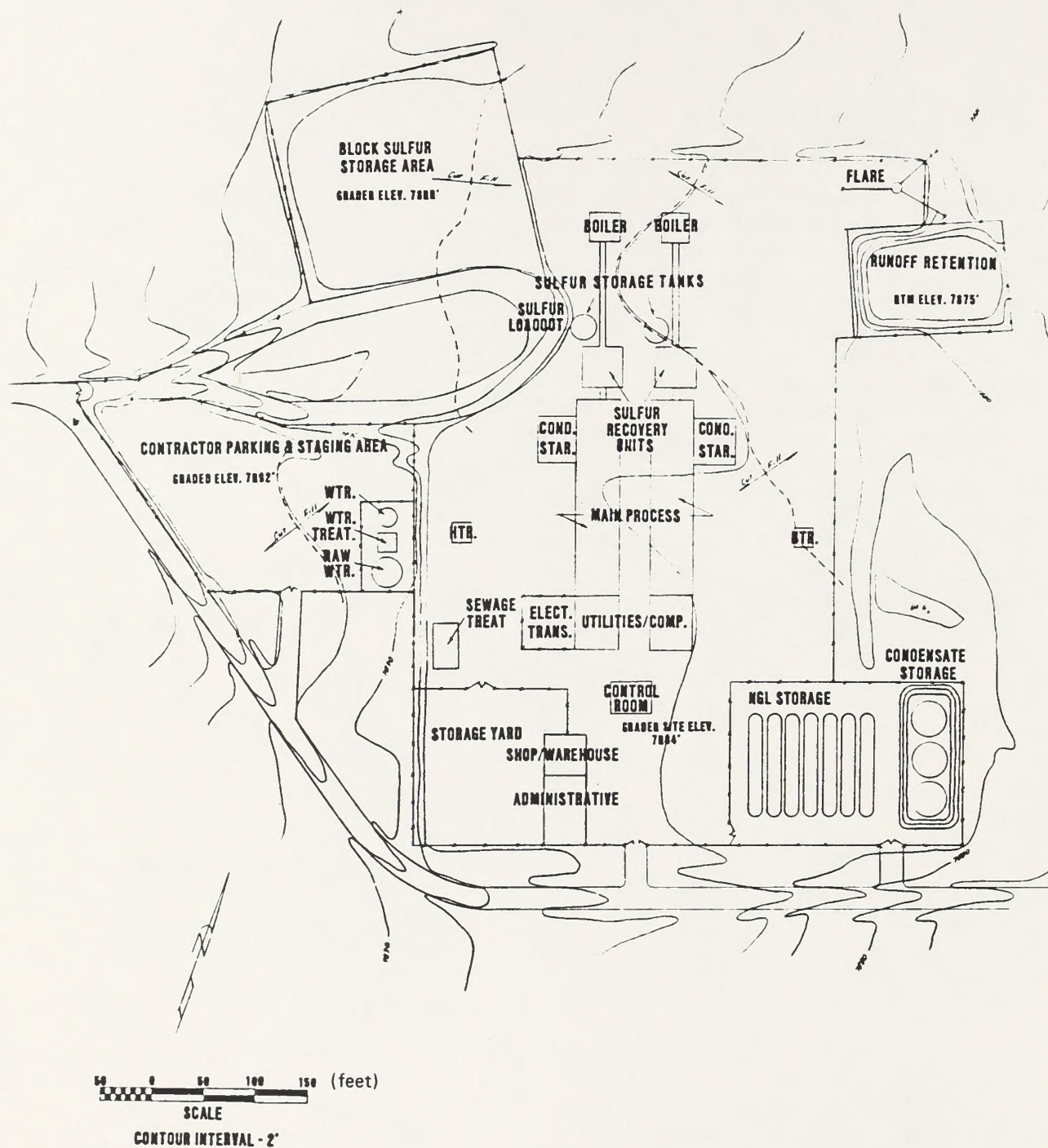


Figure 1-2. GAS PROCESSING PLANT SITE LAYOUT

Table 1-2. ESTIMATED TOTAL WORK FORCE AND CONSTRUCTION SCHEDULE, ROAD HOLLOW: 1983-1986

	1983				1984				1985				1986				1987 + (Per Year)
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
CONSTRUCTION																	
Field	-	-	20	-	-	-	20	-	-	-	20	-	-	-	20	-	20 (Peak) (Complete in 1987)
Gas Gathering Lines & Access Roads	-	-	30	-	-	-	25	-	-	-	-	-	-	-	-	-	40 (Complete 1987)
Sulfur Haul Road	-	-	20	40	40	40	40	40	40	40	40	40	40	40	40	40	-
Drilling	-	-	-	-	-	50	50	-	-	-	-	-	-	-	-	-	-
Product Pipelines	-	-	70	40	40	90	135	40	40	40	60	40	40	40	60	40	60 (Peak) (Complete in 1987)
Total Field	-	-	30	100	105	110	90	60	-	-	30	100	105	110	90	60	-
Treating Plants	-	-	15	15	10	10	0	0	-	-	-	-	-	-	-	-	-
Modules	-	-	20 ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical/Telephone Systems	-	-	65	115	115	120	90	60	-	-	30	100	105	110	90	60	-
Substation/138-kv Transmission Line	-	-	135	155	155	210	225	100	40	40	90	140	145	150	150	100	45 (Average in 1987 only)
Total Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Construction ^b	-	-	-	-	-	4	4	4	4	4	4	4	4	4	5	5	5
OPERATION																	
Field Operation and Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Treating Plants	-	-	-	-	16	23	23	18	18	18	18	18	18	31	31	26	26
Sulfur Hauling	-	-	-	-	-	-	4	4	4	4	4	4	4	8	8	8	8
Total Operation ^b	-	-	-	-	16	27	31	26	26	26	26	26	26	44	44	39	39
GRAND TOTAL	-	-	135	155	171	237	256	126	66	66	116	166	171	194	194	139	

Source: Exxon 1982.

^aPeak.

^b Assumes administrative support staff (such as secretaries and clerks) and security personnel are hired locally.

^c Assumes utilization of local contractor for sulfur hauling.

disposal site approved by the Wyoming DEQ.

- A sewage system would be installed at each module to collect human wastes. The sewage rate would be 0.6 gpm (1.0 acre-foot per year). This waste would be treated through either a packaged treatment unit or a septic tank.

Safe handling of H_2S would be emphasized during plant operation. Safety features would be incorporated into the design of the treatment modules, including: automatic shutoff valves located within the plant; sensors at critical locations near the plant site that would automatically detect H_2S and warn personnel; and relief systems for emergency flaring should leaks, accidents, or other abnormal conditions occur.

Well Production Gathering Pipelines. An estimated 11.0 miles of underground 4-inch-diameter gathering lines would be required to transport gas to the processing facilities from the eight wells currently planned for production (Map 1-3). If more than eight wells are brought into production, construction of additional gathering lines would be required. The actual mileage of any additional gathering lines would be dependent upon future well locations.

A 50-foot ROW would be needed for construction of each gathering line to provide working space on one side of the trench and an area to store excavated material on the other side. For wells located in the same general area within the well field, gathering lines to the processing plant would be laid in ROWs adjacent to each other in order to minimize surface disturbance while allowing for metering production of each well.

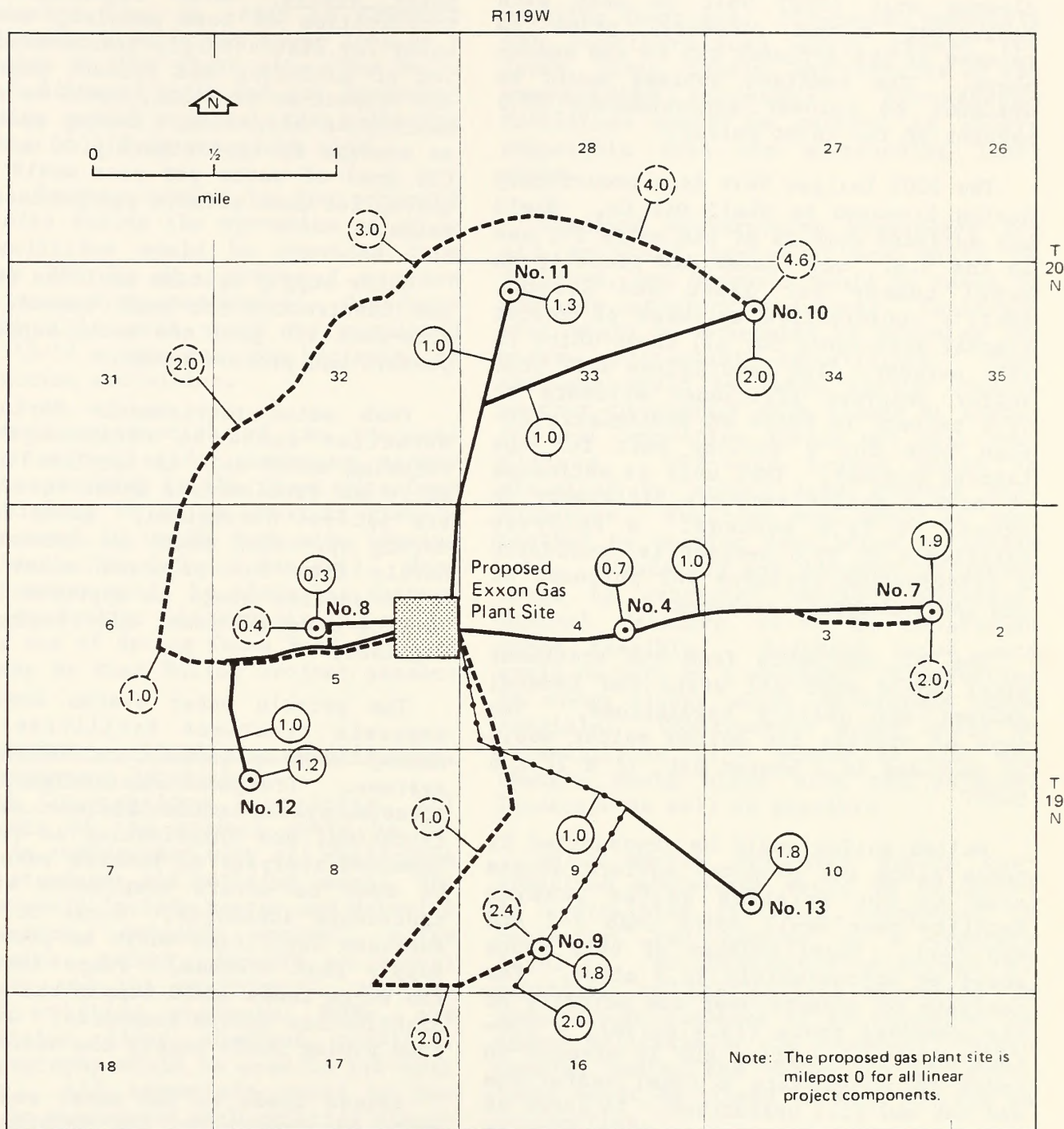
Gathering lines would be hydrostatically tested. Wastewater would be tested and, if acceptable, would be filtered and discharged. If found to be unacceptable, the water would be treated on the surface

in retention ponds or would be injected into deep wells along with wastewater from the plant site.

Sales Gas Pipeline. An estimated 7.8 miles of underground 10-inch-diameter pipeline would be required to transport sales gas south along the Bear River Divide to a purchaser in the vicinity of the Carter Creek processing facility (Map 1-2 and Map G-1). The construction ROW would be 50 feet wide. Between mileposts (MP) 5.0 and 7.8, the pipeline would parallel a ROW that has recently been used for construction of a pipeline. As a result, new disturbance in this segment would be limited to approximately 20 feet, since previously disturbed lands within the existing ROW would be used for work space.

Condensate and Natural Gas Liquids Transport. Stabilized condensate and natural gas liquids would be transported by pipeline to the existing Amoco condensate line at Ryckman Creek, a total distance of 20.8 miles. Transport of condensate and NGL would require two 4-inch pipelines spaced 20 feet apart. Each pipeline would require a 50-foot construction ROW, although the use of common work space would result in a total of 40 feet of new disturbance along existing corridors. The entire proposed route for condensate and NGL lines would parallel existing corridors or the proposed sales gas pipeline described above.

Processing and Disposal of Hydrogen Sulfide. Elemental sulfur would be produced by treating sour natural gas containing approximately 0.5 percent H_2S . The overall process diagram for each 40 million scfd module is shown in Figure 1-1. Processing would begin by separating the acid gas components (H_2S and CO_2) from the sweet gas. The sulfur recovery unit (a Claus unit or similar type of process) would then convert the H_2S to elemental molten sulfur for sale. The majority of the remaining sulfur compounds would be removed in a tail gas



LEGEND

- | | |
|---|---|
| Proposed Gas Gathering Pipeline Route | Milepost along Proposed Gas Gathering Pipeline Routes and Transmission Line |
| Alternative Gas Gathering Pipeline Route | Milepost along Alternative Gas Gathering Pipeline Routes |
| Proposed Transmission Line/Gas Gathering Pipeline Route | Gas Well |

Map 1-3. GAS GATHERING SYSTEM AND PROPOSED TRANSMISSION LINE

cleanup unit (SCOT Unit or unit with equivalent sulfur recovery) prior to release of the effluent gas to the atmosphere. The combined systems would be designed to recover approximately 99.6 percent of the inlet sulfur.

The SCOT Tailgas Unit is a proprietary design licensed by Shell Oil Co. Shell has designed some 59 of the units for use in the U.S. and Canada and probably an equal number for Japan and Europe. Shell's conservative estimate of sulfur removal efficiency for all these units is 99.7 percent. The Road Hollow SCOT Unit sulfur recovery efficiency estimate of 99.6 percent is based on preliminary design work for a similar unit for the LaBarge project. That unit is estimated to have a sulfur recovery efficiency in excess of 99.8 percent. A recovery efficiency of 99.6 percent is considered a conservative estimate for purposes of the environmental assessment.

The SO₂ effluents from the treatment plant would meet all state and federal ambient air quality regulations. Ten days of storage for molten sulfur would be provided in a heated pit, 27 x 27 x 6 feet.

Molten sulfur would be transported by truck along the proposed eastern access road to the existing sulfur loading facility near Skull Point (Map 1-2 and Map G-1). Total mileage of this route would be approximately 22.5 miles. For analysis of impacts over the majority of the proposed route (19.4 miles), a 200-foot-wide construction ROW is assumed in order to accommodate a final centerline and cut and fill operations. In areas of steep terrain, i.e., about 3.1 miles of the route (MP 2.8 - 4.7 and 18.8 - 20.0), a 300-foot-wide construction ROW would be required (Map G-1). The permanent ROW would be approximately 100 feet and would include a 24-foot-wide gravel running surface, 3-foot berms (horizontal distance) on both sides of the road, and 22-foot ditches (horizontal distance) on both sides of the road.

Water Supply. Water requirements for construction of both modules, including water for dust control, hydrostatic testing of gathering and product pipelines, and compaction of fills, would be approximately 48 acre-feet. During operation, an average of approximately 32 acre-feet (20 gpm) of water per year would be required for both potable and process water needs.

Water supply systems would be designed and constructed for peak demands of 80 acre-feet (50 gpm) and would supply both potable and process water.

Peak water requirements during construction would be obtained from an existing water well in Section 10, T19N, R119W and from surface water sources that are not yet determined. Water required during operation would be obtained primarily from the proposed water wells. Water sources would be approved by, and permits obtained from, the Wyoming State Engineer.

The potable water system would have separate treatment facilities, surge tanks, booster pumps, and distribution systems. Treatment facilities for the potable system would include settling, filtering, and chlorinating as required. Chemical analyses of potable water would be done to ensure compliance with all applicable standards. Surge tanks with adequate capacities would be provided to supply peak demands. Pumps located at the surge tanks would supply the required distribution system pressures. Distribution piping would supply the water users.

Access roads to the water well sites would be constructed for maintenance of the wells. Electric power lines to the well sites would follow the access roads and would supply power to the submersible pumps.

Electric Power Supply. A small switch rack would be located approximately 2.0 miles south of the proposed plant site at a point on the existing 138-kV

transmission line in order to transmit 138-kV power along a new power line to a substation at the plant site (Map G-1). The 2.0 miles of proposed new transmission line would parallel the gathering line from well 9 to the plant site.

Access. Primary access to the proposed plant site during the operation of project facilities would be provided from Highway 189 by the proposed eastern access road discussed above. Construction of this road would be completed within 12-14 months from the beginning of construction activities.

During construction of the proposed eastern access road, temporary access would be provided to the plant site from State Highway 30 by an existing gravel-surface road 16 to 20 feet wide (Spring Creek Road) (Map 1-2 and Map G-1). Permanent access would be along the eastern access road after its completion, and no further use of Spring Creek Road would be necessary by Road Hollow project personnel.

Construction, Operation, Maintenance, and Abandonment Procedures

General Construction Procedures. All components of the project would be designed in conformance with all applicable design standards and building codes. The designs would include energy and material conservation, emission control, noise suppression, safety, impacts on visual resources and the environment, and the use of existing roadways, ROWs, and transmission lines wherever possible. The topography would be used to its best benefit. All structures would be designed in accordance with existing standards for seismic, wind, and snow loadings for the region. Safety of the work force would be given full consideration, with good design practices, protective devices, and operating manuals provided.

Visual resource impacts would be reduced by locating and designing facilities so they would create minimal site disturbances and reduce contrast with the

existing landscape. Structural materials and configurations would repeat the forms, lines, colors, and textures of the surrounding landscape. Aboveground facilities would be painted in colors compatible with the surrounding landscape.

Standard construction procedures for all proposed installations would be followed, and measures would be taken to mitigate construction impacts. Construction would be scheduled to minimize impacts, particularly to wildlife. Precautions would be taken during adverse weather to prevent such things as tracking and compaction during wet soil conditions. Off-road travel would be minimized to reduce land surface disturbances. Fugitive dust would be controlled by wetting down areas as necessary. Vegetation and adjacent resources would be protected wherever possible. Natural drainage would be maintained where feasible. Sidehill bench cuts would be kept to a minimum. Construction on steep slopes would be avoided where feasible. Construction sites would be rehabilitated in a manner so that any changes would blend with the adjacent landscape as well as possible.

Solid wastes generated during construction activities would be collected in centralized locations, compacted if necessary, and removed to a sanitary landfill, or otherwise disposed of according to the methods specified in permits, or disposed of as requested by agency officials or the landowner. Brush removed during the site-clearing operations would be stored on site for use in reclamation.

Erosion Control, Restoration, and Revegetation Measures. Construction procedures would include implementation of erosion control and revegetation measures to ensure that lands disturbed by construction activities would be restored as soon as is practicable to a stable, productive, and aesthetically acceptable condition.

Because the proposed project ROWs are composed of different types of terrain, soils, vegetation, and facility types, the techniques and measures would be tailored to each condition encountered. Local expertise and locally effective reclamation methods would be considered.

Detailed information regarding applicable techniques and technical assistance to private landowners concerning erosion control measures would be obtained from the local Soil Conservation Districts. Technical assistance for federal lands would be obtained from the BLM. Stipulations agreed upon with the surface management agency or landowner would be followed.

During the construction phase of the project, an on-site reclamation specialist would be designated to provide liaison with private landowners, federal agency officials, and local governments; and expertise to direct applicable restoration procedures, when special conditions are encountered, without causing construction delays.

Right-of-Way and Site Clearing. Emphasis would be placed on measures to minimize the disturbance of the existing environment, including vegetation.

Land clearing would be done only on the area required for construction. Merchantable timber would be salvaged as arranged with the landowner or surface management agency. Existing ground cover such as grasses, leaves, roots, brush, and tree trimmings would be conserved. Tree limbs and trees not usable or merchantable would be stockpiled and later shredded and chipped for use in restoration operations or disposed of as arranged with the landowner or surface management agency. Trees and shrubs on the ROW that are not cleared would be protected from damage during construction.

Where any ROW crosses a creek, the banks would be stabilized to prevent

erosion. Construction techniques would reduce potential damage to creek banks, recreational areas, and fish and wildlife habitat. Cofferdams or other diversionary techniques would be used where necessary and practicable to permit flow in one part of a stream while construction occurs in another part. Care would be taken to avoid oil spills and other types of pollution in creeks and in their immediate drainage areas.

Design and construction of temporary and permanent access roads would ensure proper drainage and minimize soil erosion. Road surface and water bars would be properly maintained. Upon abandonment, roads would be restored to the requirements of the landowner or surface management agency.

During construction activities, suitable measures would be taken to prevent suspended sediments from construction areas reaching downstream watercourses.

Topsoil Preservation. Topsoil material, if available, would be stripped from all areas where surface disturbance is necessary and stockpiled in a manner and location that would allow easy replacement. These stockpiles would be protected from loss. The depth of surface material to be removed and stockpiled would be as approved by the BLM or landowner.

At the gas treating plant site, topsoil would be removed and stockpiled separately. The quantity stockpiled would be as required to reclaim cut-and-fill slopes, and other areas disturbed during construction and not required for operation. Before trenching for pipelines, topsoil would be removed from the trench, stored in a separate windrow, and protected. Where feasible, topsoil from the roadways would be removed, stockpiled along the edge of the ROW and protected.

Backfilling and Cleanup. Backfill would be replaced into pipeline trenches in a sequence and density similar to the

preconstruction soil condition. Backfilling would be conducted so as to minimize further disturbance of vegetation. The contour of the ground would be restored to permit normal surface drainage. Surfaces would be graded to conform to the existing surface of the adjoining areas, except for a slight crown to compensate for natural subsidence.

Upon completion of construction, all disturbed areas not required for operation would be reshaped as closely as possible to their original contours. These areas would be made to blend into the adjoining areas as well as conditions would permit. The surrounding landscape would be simulated as well as is practicable; for example, in the case of rock outcroppings, coarse fragments would be placed on the disturbed areas.

Materials unsuitable for placing into fill areas, such as excess fill material and construction debris, would be disposed of in a waste area arranged with the landowner, or other authorizing official, in conformance with the Wyoming Department of Environmental Quality (DEQ) regulations.

In strongly sloping and steep terrain, erosion control structures, such as water bars, diversion channels, and terraces, would be constructed to divert water away from the construction site and reduce soil erosion. Stream banks would be restored to original contours or to a more gentle slope.

Structures such as fences, gates, irrigation ditches, and roads damaged during construction would be restored to a condition as good as that existing prior to construction.

The stockpiled topsoil would be placed on the disturbed areas in a uniform thickness to allow the establishment of desired vegetation.

Land Preparation for Seeding. Construction, backfilling, and cleanup

operations may cause compaction and alter soil conditions that affect soil productivity and seeding success. The following practices would be used if needed to improve these soil conditions, prevent soil erosion, and provide a favorable seed bed.

The soil would be chiseled with suitable equipment to reduce compaction and improve soil permeability. Pitting and contour furrowing would be done on steeper slopes to increase infiltration and reduce runoff and erosion. A firm and friable seed bed suitable for the establishment of grass stands would be provided.

Suitable mulches and other soil stabilizing practices would be used where necessary to protect unvegetated soil from wind and water erosion and to improve water absorption. Special mulching practices or matting may be necessary in critical areas, where wind and water are serious erosion hazards, to protect seeding and seedlings after germination. Rock mulches would be used in steep-sloping rock outcrop areas to reduce erosion and promote vegetal growth. Cultivation and land preparation operations on steeply sloping areas would be done along the contour to minimize erosion.

Commercial fertilizers would be applied to soil areas with low inherent fertility to establish grass seedings. Application rates would depend on annual precipitation and other conditions. The use of all biochemicals, including fertilizers, would comply with all applicable laws regarding their use. The use of herbicides and pesticides is not planned at this time.

Revegetation. To contribute to a successful revegetation program, methods and procedures would be consistent with local climate and soil conditions. Revegetation of lands disturbed by construction would be in accordance with applicable regulations and permit requirements.

Species and seeding rates effective in controlling erosion would be used to revegetate the disturbed areas. Species would be selected after consideration of climatic adaptation, species adaptation to soil texture, possible adverse conditions such as drought or saline soils, palatability to wildlife, and shrub cover for wildlife. Native plant species that would be given special consideration due to their importance to wildlife include big sagebrush and native grasses. Generally, commercially available native species, as approved by the landowner or surface management agency, would be used.

A seed mixture would be formulated for general use in revegetation on the permit area. Alternative seed mixtures for revegetating critical areas would be formulated on the basis of specific site conditions. Examples of possible seed mixtures include: a riparian seed mixture to be seeded along streams and drainages; a grassland seed mixture consisting primarily of native grass species for seeding relatively flat, dry areas; a shrubland seed mixture for use in seeding higher-elevation sideslopes; and a high-altitude seed mixture including grass and shrub species that thrive above 7000 feet.

Seed mixtures would be seeded in spring or fall, preferably before mid-April and after mid-October. Seeding dates are weather-dependent and therefore cannot be rigidly set.

Revegetation efforts would be continued until a vegetal cover satisfactory to the landowner or surface management agency is established. The practices that would be used are described below.

A firm, suitable seed bed would be prepared. This would include a mulch of plant residues, or other suitable material, where required. Seed would be planted by drilling, broadcasting, or hydroseeding. The use of a rangeland

drill would be the preferred seeding method. Seeds would be drilled on the contour where possible, in order to leave shallow contour furrows for erosion control. Areas not accessible to a rangeland drill would be broadcast by hand on small areas. Broadcast seeding rates would be double those for drill application. Approximately 10 pounds of pure live seed per acre would be seeded by drill application; 20 pounds of pure live seed would be distributed in broadcast applications. Hydroseeding would be done in critical, difficult areas.

The disturbed and reseeded areas would be inspected to monitor the success of erosion control measures and revegetation programs. The areas would be maintained until a satisfactory vegetal cover is established. The monitoring program would help identify problem areas and corrective measures to ensure vegetal cover and erosion control.

In the event a weed control problem on the disturbed areas is identified, local county authorities would be consulted to obtain the most appropriate weed control methods.

Pipeline Construction Methods. Typically, pipelines would be laid in a continuous operation, or a "spread," consisting of equipment and crews handling various types of construction activities for a given pipeline segment. The major activities would be clearing, trenching, stringing, bending, line-up, welding and radiographic examination of pipe, coating and wrapping of pipe, lowering-in pipe, tie-in of pipeline, and cleanup and restoration of site. Figure 1-3 shows the various pipeline construction activities.

Typically, pipeline trenches would be placed 20 feet from one edge of the ROW, thus providing 30 feet of work space on one side and 20 feet of area to store excavated material. Figure 1-4 shows a typical construction ROW cross-section. Hand excavation would be required to

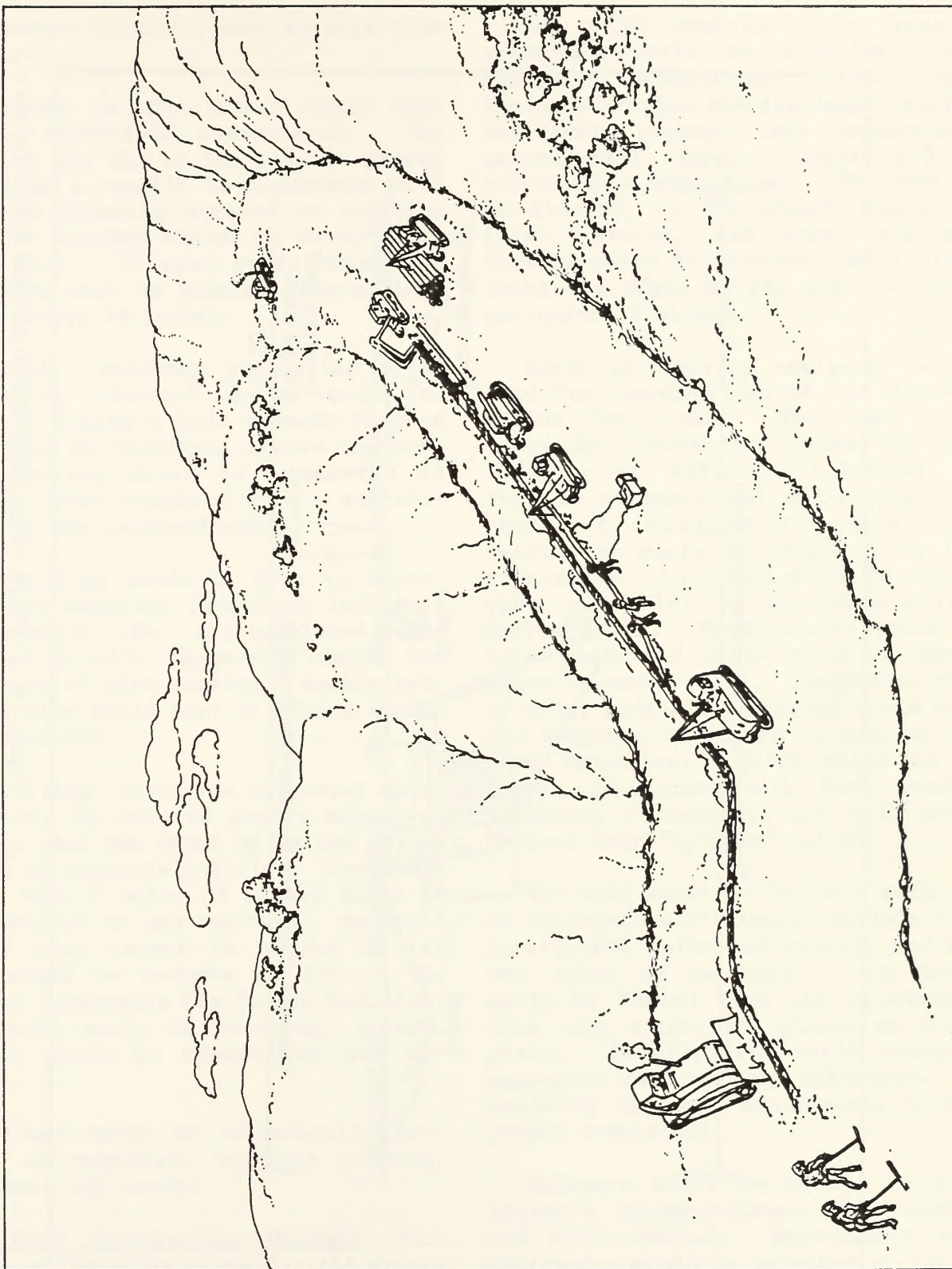


Figure 1-3. TYPICAL PIPELINE CONSTRUCTION SPREAD

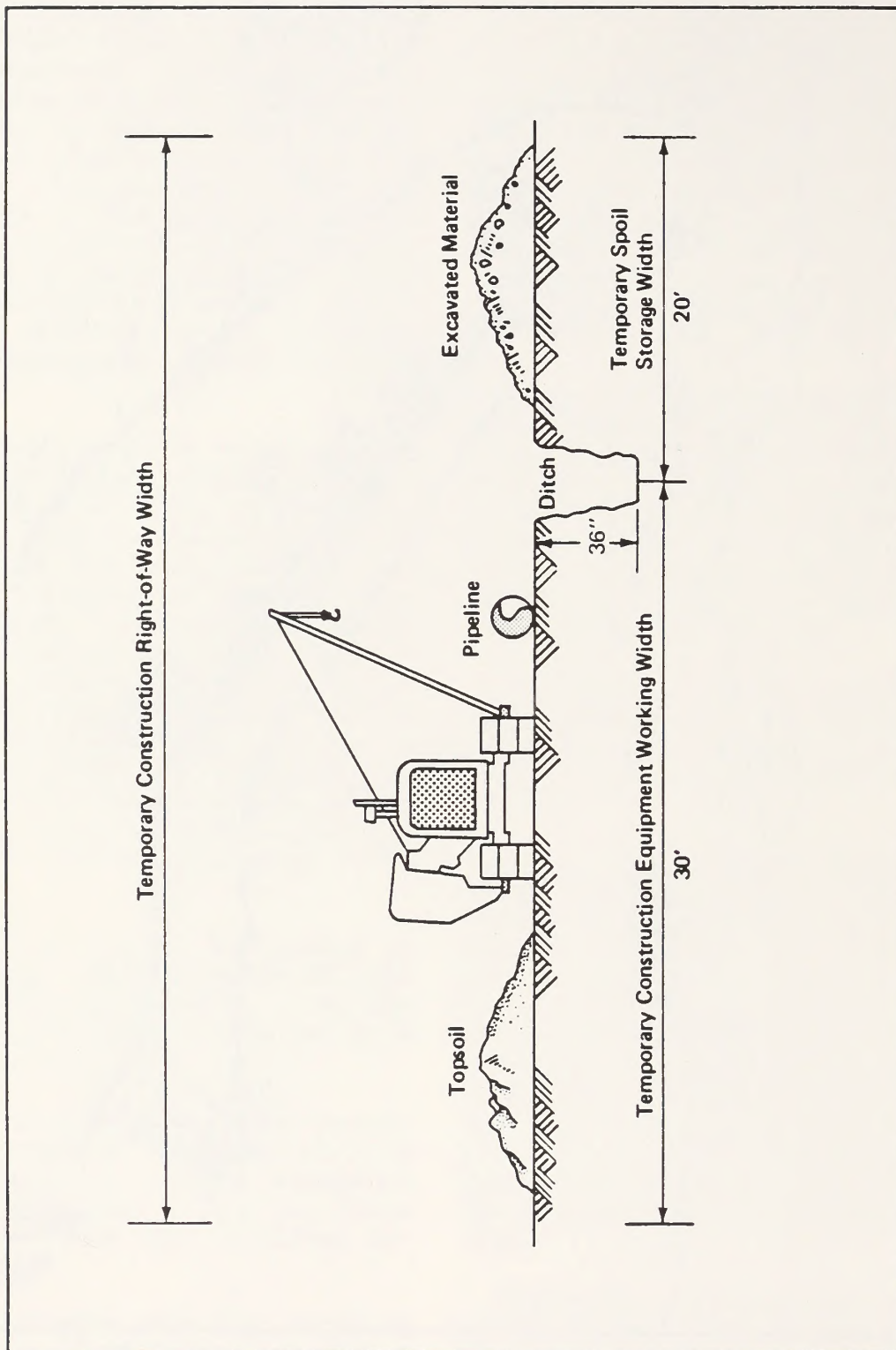


Figure 1-4. TYPICAL PIPELINE CONSTRUCTION RIGHT-OF-WAY CROSS SECTION

locate buried utilities such as pipelines and cables.

The depth of the trench would vary with the conditions encountered. The cover from the top of the pipe to ground level would generally be a minimum of 3 feet. When crossing streams or existing roads, the minimum amount of cover would be 4-5 feet. In open areas where the trench line must be blasted, the minimum cover would be 18 inches.

Generally, roadbeds supporting paved roadways or railroad tracks would be crossed by boring a hole beneath the bed rather than by trenching across the surface. Casing would be installed at crossings where required by the authorities or by the railroad owner.

Pipe welding would be done in accordance with American Petroleum Institute (API) Standard 1104. All completed welds would be visually inspected before the application of pipe coating. Radiographic inspection would meet or exceed applicable standards.

Backfilling, using the excavated material, would be done in such a manner as to ensure that the space below and beside the pipe is completely filled. Typically no more than 7 miles of trench would be left uncovered at any one time. Backfill material that cannot be placed in the trench would be crowned on top of the trench to compensate for future settling. The topsoil would be uniformly spread. The site would be cleaned up and re-stored.

Pipelines would be cathodically protected, if required, by pipe coating, rectifiers, and anodes.

Access Road Construction Methods. Preliminary engineering plans for the access road would provide detailed information regarding roadway width, maximum grade and length at that grade, location of turnouts, location and size of culverts, surface material, and erosion control.

The major activities for road construction would be clearing, topsoil stripping, excavation, construction of drainage ditches and drainage structures, surfacing, cleanup, and restoration of cut-and-fill slopes. Figure 1-5 shows the various operations. The ROW would be cleared, to the extent required, of trees, shrubs, and other vegetation. Topsoil would be stripped and stockpiled along the edges of the ROW for reuse on cut-and-fill slopes.

Heavy earthmoving equipment would be used for construction of the access and sulfur haul road. The road subgrade would be constructed primarily by the side-borrow method, utilizing wheel tractor scrapers and bulldozers. Sections of through-cut, cut-fill, and embankment would be required in uneven topography. Earthwork would be balanced, when possible, to minimize waste or borrow areas. Motorgraders would maintain grade and side-slopes as the subgrade is constructed. Sheepsfoot rollers or other suitable equipment would compact the subgrade in layers to achieve specified densities. Water would be added during compaction with tank trucks as necessary to maintain the soil moisture content near "optimum" values.

The road would be surfaced with crushed aggregate sufficiently durable for the anticipated volume of traffic and weight and speed of vehicles. The material would be hauled from the crushing site with dump trucks and placed on the subgrade. Motorgraders would spread the aggregate to a uniform thickness. Water would be applied as necessary to ensure proper compaction.

Culverts would be placed to provide adequate cross-drainage for streamflow and ditch relief. Appropriate erosion protection would be provided at the inlet and outlet of each structure.

Operation and Maintenance Procedures.
Treatment Plant Operation and Maintenance. Each 40-million-scf/d treating

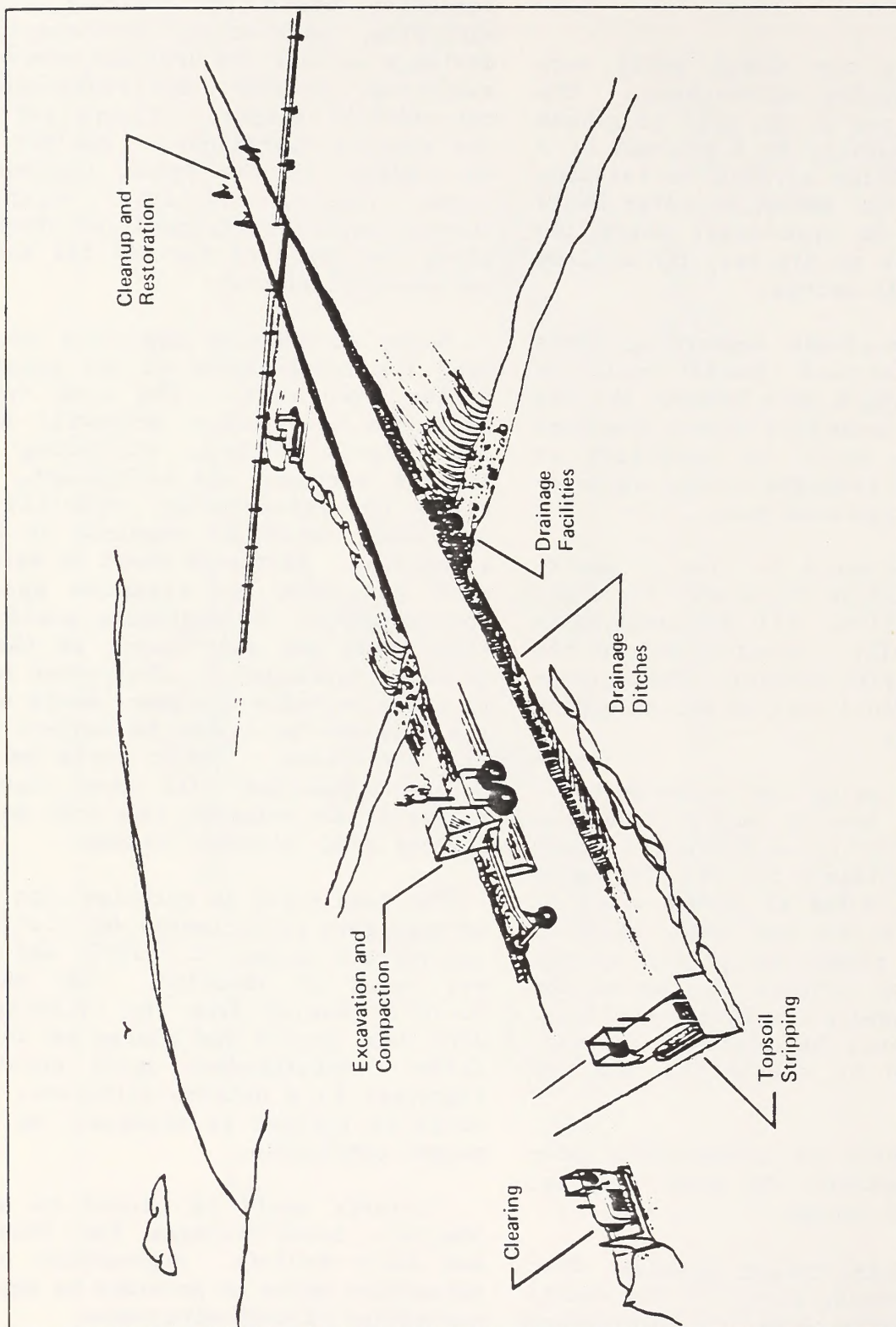


Figure 1-5. TYPICAL ACCESS ROAD CONSTRUCTION

module would be designed to operate 24 hours a day, 7 days a week. The operations and maintenance personnel requirements for two modules are estimated to include a total of 31 people when both modules would be in operation.

Safe handling of H₂S would be considered during plant operation. Safety provisions are necessary for emergency situations to protect employees and individuals in the immediate vicinity. Therefore all personnel working in the plant would participate in an employee safety program based on training, detection, symptoms, characteristics, safety practices, first aid, and proper use of protection equipment. A contingency plan for the protection of employees and other people in the area would also be developed. The plan would include an organized plan of action for alerting and protecting the public in case of an accidental release of a potentially hazardous volume of H₂S. The plan would be activated immediately upon detection of such an accident, with provisions detailed in the Exxon Operation and Safety Manual for the Road Hollow project.

A system for detecting hazardous concentrations of H₂S would be used. Systems of this type consist of sensors at critical locations in the project area that automatically detect H₂S and warn the affected personnel. The signals can be remotely monitored for continuing surveillance. Respiratory protection equipment would be strategically located to be readily accessible to work areas in case of an emergency.

In addition to the H₂S safety measures, a General Emergency Plan would be prepared for the facility. Its purpose is to provide preparedness for emergency situations such as electric power failure, winter storms, accidents, and fires. Considerations in this plan are detailed in the applicant's Operation and Safety Manual for the Road Hollow project.

Operating and maintenance manuals would be provided by the engineering contractor(s) prior to startup. The operations and maintenance personnel would undergo a thorough training program before the plant begins operation. A preventive maintenance program would be instituted so that critical items are inspected periodically.

Field Operations and Maintenance. Personnel requirements for a normal field operation are estimated to include:

- Approximately one operator per shift to monitor field production
- One maintenance, or roustabout, crew consisting of three people for repair/maintenance work

The H₂S contingency plan and general emergency plan for field operations is discussed above for the gas treatment facility.

Corrosion protection would be provided for the gas gathering system. Cathodic protection of the pipelines would be provided if the soil conditions make it necessary. Corrosion coupons would be regularly taken to detect corrosion problems. Corrosion-resistant materials would also be used as necessary, to minimize maintenance and repair of exposed equipment, and to reduce hazards to personnel.

Abandonment Procedures. After the end of the economic life of the project is reached, operations in the field and at the treatment plant facilities would be terminated. Rights-of-way would revert to the control of the private landowner or surface management agency.

Unless specified by the landowner or surface management agency, all salvageable structures would be disassembled and all salvageable materials would be removed from the sites for reuse. Specifically, all gas gathering pipelines would be purged and made safe. All gas

gathering and water distribution pipelines would be capped and abandoned in place to minimize surface disturbances. All buildings, machinery, aboveground piping, and other equipment would be dismantled and salvaged. The gas treatment plant's vessels and other equipment would be disassembled and salvaged. The electric substation would be dismantled and salvaged. The electric transmission system would be removed and salvaged where not furnishing power to other users. All foundations would be demolished to grade so that site rehabilitation would be acceptable.

All unsalvageable materials would be disposed of in a waste area arranged with the landowner, or other authorizing official, in conformance with the Wyoming DEQ regulations.

All disturbed areas would be rehabilitated. The areas would be reshaped to blend into the adjoining areas as well as conditions would permit. Sediment barriers, terraces, and berms would be constructed and maintained to minimize erosion. All disturbed areas would be reclaimed as discussed above under revegetation.

The aforementioned rehabilitation activities are based on the assumption that no unforeseen future events would dictate otherwise. Given the long duration of the project required to recover the reserves of gas present, needs for facilities, roads, or electric transmission lines could arise to justify their continued existence.

Applicant-Committed Practices

The applicant would undertake a number of design, construction, and restoration practices in addition to those already discussed. The resource considerations outlined below are intended to reduce adverse environmental impacts. The applicant would be required to incorporate these practices into the Plan of Operations, which encompasses the con-

struction through termination phases of the proposed project.

Although a ROW application for product sales pipelines has not been submitted, design, construction, and restoration practices potentially applicable to these components are provided below as a basis for analysis of impacts in Chapter 3 of this EA.

Noise. All equipment (construction and operational), buildings, or other facilities would be operated, designed, or constructed according to Occupational Safety and Health Administration (OSHA) requirements for noise.

Geologic Hazards. The applicant would design plant facilities to meet structural design requirements applicable to a seismic risk zone 2 as specified under ANSI (American National Standards Institute) A58.1.

Paleontology. To reduce potential impacts to significant fossils in highly sensitive bedrock units as a result of bedrock disturbance during construction, the applicant would implement a three-step management plan.

1. A surficial field inventory would be conducted by a BLM-approved paleontologist where bedrock would be disturbed in areas underlain by geologic units assigned a high sensitivity rating.
2. An evaluation would be made of the significance of any fossil localities identified during the field inventory.
3. If it is determined that significant fossils would be affected by bedrock disturbance, mitigative measures would include rerouting sections of linear project components to avoid specific fossil localities, or construction monitoring (by a BLM-approved paleontologist) in these areas to recover the resources for scientific interpretation and

reporting. If rerouting or construction monitoring cannot be implemented or would not be effective, the applicant would undertake to recover, in the best reasonably possible manner, specific significant fossil data prior to disturbance.

Water Resources. To reduce adverse impacts associated with discharge of hydrostatic test water, the applicant would implement the following measures:

1. If surface-water discharge is necessary, watercourses with the greatest background flow would be selected.
2. To prevent erosion at discharge sites, test water would be released slowly.
3. Water would be discharged horizontally into a discharge diffuser pipe to minimize flow velocity and prevent potential scour effects.
4. Water would be routed through detention basins prior to discharge or through mechanical filters to reduce the levels of suspended solids and iron.
5. If grease and oil are present, water would be routed through one or more straw bale filters, in sequence, to reduce concentrations to acceptable levels.

To reduce the potential impacts resulting from truck or pipeline spills, spill prevention and containment contingency planning would be implemented. This plan would be incorporated into the Plan of Operations.

To reduce potential impacts associated with water withdrawal from creeks or streams, surface-water withdrawal would be limited to less than 10 percent of the available flow.

Wildlife and Vegetative Resources. Habitat loss and disturbance to important mule deer summering habitat and raptor breeding habitats, including aspen stands, serviceberry shrubland stands, and cliffs, would be reduced by:

1. Avoiding these areas to the extent possible in the siting of all project facilities
2. Including shrub reestablishment in the reclamation-revegetation program

Mule deer and wildlife mortality caused by collisions with vehicles on access roads would be reduced by:

1. Ride-sharing by workers commuting to and from site
2. Establishment and enforcement of vehicle speed limits on access roads

Illegal hunting (poaching) and harassment of wildlife would be discouraged by:

1. Prohibiting the transporting of weapons (handguns, rifles, shotguns, hunting bows, etc.) onto the work-site
2. Prohibiting workers from bringing dogs on the worksite
3. Developing and implementing a worker education program

Disturbance of mule deer on crucial winter range would be reduced through ride-sharing by workers to project facilities.

Deterioration of aquatic habitats due to sediment inflow from construction areas would be reduced by controlling surface-water runoff from construction areas with drainage ditches, water bars, and sediment catchment basins.

Livestock Grazing and Range Resources. Disruption to domestic sheep lambing operations would be reduced by avoiding or limiting construction activities near lambing grounds between May 1 and June 10.

Employees would be instructed to report when vehicular traffic or project-related activities result in the killing of livestock. Livestock owners would be reimbursed for any loss on the basis of

the then current market value for the killed animal. In addition, workers would be warned of the potential for livestock on roadways and instructed to drive carefully.

Cultural Resources. The BLM, in consultation with the State Historic Preservation Officer, and the applicant would use the BLM Class I cultural resources inventory data to develop a cultural resources management plan. This plan would involve the conduct of a BLM Class III inventory in those areas where ground disturbance would occur and for which no previous Class III inventory has been conducted. Identified resources would then be evaluated as to their significance and management needs, with a preference for protecting significant materials in place. Cultural resources that could not be avoided or protected would be preserved in part through scientific investigation, to salvage an adequate sample of the information value of the resource to be adversely affected. Procedures for designing and implementing such data recovery programs are clearly set forth in 36 CFR 800, BLM Cultural Resource Management Manual 8100, and various instruction memoranda. Details of the management plan would be stipulated in the Plan of Operations for the project. In addition, the applicant has agreed to the following actions for mitigating any potential adverse effects to the Oregon Trail caused by upgrading the proposed eastern access road along the Bear River Divide:

- Avoid crossing the Oregon Trail at those locations stipulated by BLM (generally where well-preserved wagon ruts exist).
- Construct a visitor turnout and interpretive display focusing attention on views of undisturbed portions of the trail. An interpretive display would probably consist of a National Park-type display using metal weatherproof signs to identify specific features and to provide a brief history of features.

- Place signs designating restriction of off-road-vehicle use in order to lessen damage to the trail.
- Construct physical barriers to restrict access at locations where the trail is crossed by a project component.

Visual. Visual contrasts would result where the proposed access roads or pipeline ROWs intersect identified historical trails. To reduce these impacts, priority would be given to reclamation of these portions of the ROW and measures discussed for cultural resources would be implemented.

Recreation. Visual resource (scenic) consequences resulting from construction activities along road and pipeline corridors visible from historic trails (Oregon Trail) would affect the quality of the recreation experience by altering the naturalness of surrounding landscapes. To reduce these impacts, the measures outlined for cultural and visual resources (including signs and physical barriers) would be implemented.

To reduce potential impacts to the big game hunting resource as the result of poaching and increased human disturbance, measures discussed for wildlife resources would be implemented.

Transportation. Contractors would be strongly encouraged to institute ride-sharing or other means to reduce vehicle traffic as part of any contract agreement. Applicant employees would also be encouraged to ride-share. The applicant would assume responsibility for road maintenance shown by the responsible local government agencies to be in excess of that maintenance previously required or undertaken. For example, development and maintenance of culverts would be provided for unpaved roads, and snow removal would be undertaken for those roads that had not previously been cleared. The applicant would work closely with the appropriate local officials to determine maintenance requirements.

Socioeconomic Conditions. The total number of project-related jobs obtained by local residents would be increased through one or both of the following actions:

1. The applicant or his contractor would work with a local agency, such as the Kemmerer Office of the Wyoming Job Service, when hiring workers for the project. Persons who would be seeking work on the project would be referred to the Job Service to complete appropriate applications. The Job Service would provide facilities for the applicant or contractor to interview potential workers.
2. The applicant would actively recruit qualified applicants for entry-level jobs from among local residents and provide training to prepare them for operating jobs.

The proposed project and associated construction work force would increase the population of affected communities which, in turn, would increase demands on public services (including law enforcement, community recreation, health and social services, and libraries) and would also increase demand on temporary and permanent housing. Worker demand for temporary housing could compete with tourists, business people, and other workers. To reduce these adverse impacts, the following measures would be implemented:

1. To reduce competition for temporary housing, a housing plan would be developed by the applicant. Specific provisions of this plan would be identified as the project nears the projected construction start date when existing conditions in affected communities (e.g., availability of temporary housing and options available) can be more accurately assessed. Examples of what the components of a housing plan could include are given in

Chapter 3. The final identification of the housing plan components would be specified in the applicant's Plan of Operations before the start of construction.

2. To reduce potential adverse impacts to social service agencies, the applicant would establish a monitoring system in conjunction with those agencies. If it is determined that social service agencies experience significant staffing or facility shortages due to demands by project-related workers (which would be documented by the agency), they would receive assistance from the applicant to help meet the additional needs resulting from the project.

The proposed project would increase enrollments (50-160 students between 1984 and 1986) and expenditures in Lincoln County School District No. 1, while project-related ad valorem tax revenues would accrue to Lincoln County School District No. 2. Because Wyoming is in the process of restructuring its school finance procedures, it is unclear whether or not District No. 2 could or will be made by law to transfer funds to District No. 1 to offset project-related operation costs.

The applicant would monitor this situation through contact with the respective school and Wyoming state officials to identify or create mechanisms to help defray District No. 1 expenses during operation-related use periods. Applicant participation would be only for school overload situations created by the Road Hollow project operation-period use.

To reduce traffic congestion within communities housing the work force, workers would be encouraged to ride-share. Other transportation mitigation measures may be appropriate depending on the structure of the housing plan. A more specific transportation plan would be integrated with the housing plan developed in the Plan of Operations.

ALTERNATIVES

The EA process requires identification of reasonable alternatives and consideration of environmental, social, and economic effects of these alternatives. In the following sections, brief descriptions are presented for all reasonable alternatives to the proposed action that were subjected to further analysis. Alternatives not selected for more detailed analysis are identified and reasons for their not being further considered are given. Only those aspects of the alternatives that are different from the proposed action are discussed.

No Action Alternative

If the BLM does not issue the ROWs necessary for the proposed action, the applicant could not construct the proposed treatment plant or ancillary facilities because the proposed treatment plant and almost the entire system of linear facilities would be located on public land.

The no action alternative would affect the human environment by not allowing recovery of 80 million cubic feet of gas a day and thus would increase the country's dependency on foreign supplies. In addition, future income and construction and operation jobs that would be generated by the proposed action could not be realized. Estimated ad valorem and mineral/severance taxes per year generated by the proposed action would be approximately \$18 million (based on estimates for 1986); construction work force would total 283 at the peak of construction and operation work force (including associated indirect jobs generated) would average 80 over the 20-year life of the project.

In general, the impacts summarized in Chapter 1 and discussed in Chapter 3 for the proposed action would not result from the no action alternative.

Project Components

Gas Treatment Alternatives.

Use of Existing Facilities. The potential use of existing gas treatment facilities at Chevron's Carter Creek plant and Amoco's Whitney Canyon plant was explored with representatives of both companies. The response of the companies was that capacity in their plants is committed until the plants become operational and the facilities are fully tested. Because of the timing of field development plans, use of existing facilities is not considered feasible due to uncertain processing capacity within the applicant's field development schedule. Although use of existing facilities is not considered feasible for the purpose of this EA, the use of Amoco and/or Chevron facilities will be pursued as part of ongoing negotiations.

Gas Treatment Plant Size and Capacity. In August 1982, the applicant's geologists and reservoir engineers assessed the estimated recoverable reserves in the structure to be produced at Road Hollow between 100 and 200 bcf. They concluded that a 40 million scfd plant and a one-rig drilling program was optimum for producing those reserves because:

- Present value profit (a measure of netback on capital invested) was as good as for an 80 million scfd plant and better than for a 120 million scfd plant.
- Pre-investment (in more facilities) risks caused by geological and reservoir unknowns are minimized.
- Design changes can be incorporated in another 40 million scfd module if gas composition varies without substantially changing project economics.

Expanding the Road Hollow project beyond 80 million scfd could not be justified technically, economically, or based on capacity considerations because:

- The predicted reserves would be produced too fast to warrant the capital expenditures to produce them, i.e., the present value profit and the return on investment would be lower than for a 40 or an 80 million scfd plant.
- Even at 40 million scfd, additional reserves must be found and produced to extend the useful life of the project to 20 years, i.e., at 40 million scfd the known recoverable reserves will be produced in 8-15 years. At 80 million scfd starting in 1986, the known recoverable reserves would be produced in 5-8 years (assuming a 90 percent plant service factor). Therefore, substantial processing capacity would exist for production of additional and as yet undiscovered reserves by about 1992.

Inclusion of an additional module would be based only on speculation as to future discoveries in the unit and was therefore not considered feasible.

Gas Treatment Plant Site Alternatives. Alternative sites for the gas treatment plant within the general vicinity of the well field were considered during site reconnaissance. No alternative sites were identified as having environmental advantages over the proposed site. The reconnaissance considered factors such as proximity to the Road Hollow gas field, favorable topography for plant construction and air dispersion characteristics, and proximity of existing access.

An alternative site near the existing Amoco and Chevron sulfur loadout facility at Skull Point (Map 1-2), approximately 10 miles south of Kemmerer, was identified for consideration. This site was not analyzed further because of the necessity for increased length of gathering lines and associated increased risks with transport of the sour gas. Closer proximity of SO₂ emissions to a population center was also considered a disadvantage.

Well Production Gathering Lines. Alternatives to four of the proposed gathering lines (to wells 7, 8, 9, and 10) were selected for further analysis in an effort to reduce surface disturbance. Alternative routes 1 and 4 total 9.4 miles of buried 4-inch-diameter gathering lines, which are shown on Map 1-3. Rights-of-way required, total acres disturbed by construction and operation, and the status of lands involved are given in Table 1-1. Construction and operation procedures would be the same as discussed for the proposed action.

Sales Gas Pipeline.

Alternative 1. If negotiated use of an existing pipeline near the Carter Creek treatment plant is not available, the gas may have to be transported farther to another existing pipeline. One possible alternative would require a total of 18.2 miles of underground 10-inch-diameter pipeline extending south along the Bear River Divide Road to a purchaser in the vicinity of the Whitney Canyon processing facilities (Map 1-2 and Map G-1). This alternative would require a 50-foot construction ROW and would follow the same route as that discussed for the proposed action to the Carter Creek facility. The alternative route would then parallel an additional 10.4 miles along existing pipelines. Overlap with the existing ROW would limit new disturbance for this alternative to 10.4 miles within a 20-foot corridor beyond that discussed for the proposed action. Land status and total acres disturbed during construction and operation are shown in Table 1-1.

Alternative 2. An estimated 17.5 miles of underground 10-inch-diameter pipeline would be required to transport sales gas north along the Bear River Divide to the existing Northwest Pipeline Company's Kemmerer compressor station near Highway 30 (Map 1-2 and Map G-1). The 50-foot construction ROW would be parallel and adjacent to the proposed Northwest Trunk A gas pipeline over its entire length. The Northwest Pipeline

proposal is on the verge of BLM approval and ROW Grant Issuance. Overlap with the approved Northwest Trunk A ROW and use of common work space limit the area of analysis in this EA to a 20-foot corridor beyond that already analyzed in the EA for Northwest Trunk A. Land status and total acreage that would be disturbed are shown in Table 1-1.

Alternative 3. If the Northwest Pipeline Company Trunk A pipeline exists by the time the applicant needs sales gas transportation, Exxon may be able to negotiate to use that facility, which would negate the need for alternative 2.

Condensate and NGL Transport.

Alternative 1. If negotiated use of the existing Amoco condensate line at Ryckman Creek is not available, the proposed 4-inch condensate line would be extended 12.8 miles south along the existing MAPCO ROW to the vicinity of Divide Junction to Amoco's main east-west condensate line. If capacity for NGL is not available in the MAPCO line at Ryckman Creek, the proposed 4-inch NGL line would also be extended 12.8 miles south along the existing MAPCO ROW to Divide Junction. These alternative lines would require a 50-foot construction ROW and would also be spaced 20 feet apart immediately adjacent to the existing pipelines. New disturbance of lands outside previously disturbed ROW would therefore be limited to a 40-foot width because of use of common work space. Land status and total acreage disturbed are shown in Table 1-1.

Processing and Disposal of Hydrogen Sulfide.

Alternative 1. Molten sulfur would be transported by truck south along the Bear River Divide Road to the existing Chevron sulfur pipeline and then transported by pipeline to the existing load-out facility (Map G-1). Approximately 6.9 miles of the Bear River Divide Road

between the proposed plant site and the existing molten sulfur line would be upgraded from a 16-to-20-foot running surface to a 24-foot running surface.

Alternative 2. Molten sulfur would be transported by truck south along the Bear River Divide Road and existing Amoco sulfur haul road and then east on the Amoco sulfur haul road to the general location of Little Hogback. At this point, haul trucks would proceed east approximately 3 miles on Dee Ranch Road to Highway 189 and then north on Highway 189 to the existing sulfur loadout facility. Total mileage of this route would be approximately 55 miles. Upgrading of existing roadways would be necessary only between the proposed plant site and Carter Creek as discussed for alternative 1.

Alternative 3. If there is not sufficient demand for sulfur at the existing loadout facility, another buyer at some other location would be sought. Molten sulfur would be transported by truck via the proposed eastern access road or the existing Amoco sulfur haul road described above.

Alternative 4. If no immediate purchaser can be found, molten sulfur would be poured into molds and stored as bricks in a cleared, bermed area located within the proposed 40-acre plant site. This storage would accommodate 1 year's production at full operation.

Alternative 5. An alternative to conventional Claus sulfur recovery and tail gas cleanup for H₂S in gas streams would be the ammonium thiosulfate (ATS) process. The process produces ATS (a salable fertilizer for highly alkaline soils) instead of the molten sulfur that is produced by the Claus sulfur recovery process. The ATS sulfur removal efficiency is comparable to the Claus and tail gas cleanup systems.

To produce ATS, H_2S is converted to SO_2 through oxidation generating high-pressure steam. The SO_2 is then introduced into an absorber where it is contacted with anhydrous ammonia. Ammonium bisulfate (ABS) is produced and then contacted with H_2S from the sweetening system in a reactor. The ATS system requires storage for anhydrous ammonia that would be added to the system and large heated storage of ATS, which is marketable only in the spring and fall. ATS systems produce approximately four times the product of a Claus system--i.e., an equivalent 10 tons per day (t/d) Claus plant would be replaced with a 40 t/d ATS system. ATS can be trucked to market more safely than molten sulfur.

Ammonia would be transported in rail cars to the siding at the Amoco/Chevron sulfur loadout facilities. Three cars per month would be required to supply sufficient ammonia to produce 40 t/d of ATS from one 40 million scfd plant. The rail cars would be unloaded and trucked to the plant site. One truck every 4 days would be required to supply each 40 million scfd module. Two trucks per day of ATS product per 40 million scfd plant would be transported to a storage/shipping facility located at the siding.

Storage facilities for each 40 million scfd plant would include:

<u>Material</u>	<u>Plant Site</u>	<u>Rail Siding</u>
Ammonia	40,000 lb	158,000 lb (in the rail car)
ATS	1000 bbl	50,000 bbl

Emissions expected from the ATS process for each 40 million scfd plant would include:

SO_2 - 24.5 tons/yr
 NH_3 - 250 ppm from absorber stack

There would be a water purge from the process of up to 5 gpm. Contaminants include ammonium, calcium, and sodium

sulfates and sulfites. Water would be disposed of by underground injection.

Water Supply.

Alternative 1. If sufficient water supply cannot be obtained from the proposed or alternative wells, an effort to negotiate water purchase from Woodruff Narrows and delivery via the existing Carter Creek facilities would be made. Water would be transported to the proposed plant site from the Carter Creek water pipeline by a 7.8-mile, 2-inch-diameter pipeline generally paralleling the Bear River Divide Road.

Electric Supply.

Alternative 1. An alternative electric supply system would be to tie into the existing substation at the Carter Creek facility and transmit at 138 kV to the proposed plant site. With this alternative, approximately 7.4 miles of new transmission line would be constructed utilizing a 20-foot construction ROW paralleling the Bear River Divide Road.

Access.

Alternative 1. An alternative means of providing construction and permanent access to the proposed plant site would be use of the existing Bear River Divide Road and Amoco sulfur haul road south and east to Highway 189, as described for the alternative sulfur haul road. The distance from the proposed plant site to Highway 189 would be approximately 30 miles; the distance to Kemmerer would be approximately 55 miles. The viability of this alternative depends on negotiations for maintenance and use agreements with Amoco and possibly with other users and landowners.

If the Bear River Divide/Amoco sulfur road is used for construction and permanent access, the Whitney Canyon/Bear River Divide Road would serve as additional access, particularly for transportation of workers or materials coming from Evanston. The distance to Evanston

from the proposed plant site via Whitney Canyon Road is 34 miles.

Alternative 2. A second alternative for providing construction and permanent access to the proposed plant site would be to construct a new road in the existing 138-kV powerline corridor from Section 32, T20N, R117W, to Section 17, T19N, R119W (Map G-1). Total distance would be 22.9 miles, with 19.3 miles of new construction. The route would cross the Little Muddy Creek and a portion of FMC mine lands. The majority of the alignment would traverse low ridges and intermittent drainages and would thus result in numerous sections of road with a grade, increased need for cut and fill and other earth moving, and additional construction costs. The newly constructed road would also be used as a sulfur haul road. This alternative was not analyzed further because there would be:

- Increased potential for hydrologic and aquatic ecology impacts
- Increased disturbance to soils and vegetation in steep terrain
- Relatively high construction, maintenance, and haulage costs
- Potential for future relocation on FMC minelands

Alternative 3. A third alternative for providing construction/permanent access and a sulfur haul road would be to make maximum use of an existing road that parallels the Little Muddy Creek from Highway 189 to Section 13, T19N, R118W. Total distance would be 32.2 miles, with 11.8 miles of new construction. Utilization of this alignment would require one crossing of the Little Muddy Creek. The route would parallel portions of the Oregon Trail for approximately 6 miles and would cross approximately 6.9 miles of fee land that supports heavy range use.

This alternative was not analyzed further because there would be:

- Potential significant impacts to the Oregon Trail, livestock grazing, and aquatic ecology in Little Muddy Creek
- Increased haulage and maintenance costs not justified by construction savings
- Anticipated landowner opposition due to heavy range use along the creek

Mitigation Alternatives

Fencing of the proposed eastern access and sulfur haul road was identified by the BLM to be analyzed as a mitigation alternative. Approximately 20 miles (MP 1 to 20.5) of four-strand wire fence (Antelope type 4 with three upper barbed wire strands and one lower barewire strand) would be constructed on both sides of the 100-foot permanent right-of-way. This type of fence would effectively prevent livestock access within the right-of-way but would allow relatively free movement of game such as mule deer and antelope. Gates for providing seasonal livestock movement across the ROW would be installed at locations specified by BLM. A summary of the findings from this analysis is presented below in the section for summary and comparison of impacts.

Construction, Operation, Maintenance, and Abandonment Procedures for Alternatives

If any of the alternatives are selected, the applicant would undertake construction, operation, and maintenance using the same practices and procedures as specified for the proposed action.

Applicant-Committed Practices

The applicant would undertake a number of design, construction, and restoration practices that would be applicable to the alternatives discussed. These practices have been specified above in the discussion for proposed action.

AUTHORIZING ACTIONS

This section identifies the authorizing actions that would be needed from

certain federal, state, and local authorities in order to implement Exxon's proposal. Authorizing actions are approvals such as ROW grants, air quality and water supply permits, stream crossing permits, microwave communication licenses, and other special use permits.

FEDERAL

Bureau of Land Management (BLM)

The BLM is responsible for authorizing the actions listed below and for coordinating the preparation of ROW stipulations by affected federal agencies to ensure consistency between agencies.

1. Issuance of ROW grants for construction and operation of the plant site, pipelines, electric power line, communication facilities, and access roads. ROW grants on federal lands would be issued under authority of Section 28 of the Mineral Leasing Act of 1920 as amended (30 USC 185); Title V of the Federal Land Policy and Management Act (FLPMA) of October 21, 1976 (PL 94-579, 90 Stat. 2743 et seq.); and in accordance with the regulations in 43 CFR 2880, Oil and Gas Pipelines. The BLM Kemmerer Resource Area Manager would issue the ROW grants.
2. Prior to construction, issuance of an undetermined number of temporary use permits (TUPs) for temporary work and storage sites, and temporary access roads. These permits would also be issued by the BLM Kemmerer Resource Area.
3. Issuance of an undetermined number of Noncompetitive (Negotiated) or Competitive Sales of Mineral Material (commercial fill, sand and gravel, and other surfacing or construction material of common variety) under 43 CFR 3600. These would also be issued by the BLM Kemmerer Resource Area.

The BLM would assure compliance with certain applicable federal laws, orders,

and regulations. For this project they are:

- Endangered Species Act of 1973 (as amended), Section 7, in accordance with 50 CFR 402, Interagency Cooperation, requires consultation and coordination with U.S. Fish and Wildlife Service (including Threatened and Endangered Species clearances).
- Fish and Wildlife Coordination Act, in accordance with 50 CFR 410, requires consultation with the U.S. Fish and Wildlife Service and state game and fish agencies for NEPA compliance.
- Executive Order 11593 (Protection and Enhancement of the Cultural Environment) and the Historic Preservation Act of 1966 (as amended), Section 106, in accordance with 36 CFR 800 (Protection of Historic and Cultural Properties), requires consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.
- Executive Order 11988, Floodplain Management.
- Executive Order 11990, Protection of Wetlands.
- Wild Horse and Burro Act.

U.S. Army Corps of Engineers (COE)

Under Section 404 of the Clean Water Act of 1977 (33 USC 1344), as implemented by COE regulations (33 CFR 323), the placement of dredged or fill material for bedding or backfilling pipeline crossings is permitted under the Nationwide Permit for utility lines (33 CFR 323.4 and 323.4-3) provided that certain conditions are met. However, the COE does have discretionary authority to require individual permits for all or portions of the pipeline or access road crossings if the District Engineer determines that the concerns of the aquatic environment indicate a need for such action (33 CFR 323.4-4). On the basis of project description information supplied by the applicant, the COE District Office in

Sacramento will determine whether any individual permits are required.

U.S. Environmental Protection Agency (EPA)

Under the Resource Conservation and Recovery Act of 1976 (as amended), the applicant must fill out and submit to the EPA a Notification of Hazardous Waste Activity. Gas sweetening plants are required to file at least Part A of the Hazardous Waste Notification requirements. Wastes associated with refining, such as solvents and sludges produced by wastewater and air treatment, may be classified as a hazardous waste. The EPA will review the information supplied by Exxon to determine if a Hazardous Waste Permit would be required.

Federal Communication Commission (FCC)

The FCC requires application for an operating license for certain microwave communication systems. Should Exxon require a microwave station(s), it would submit application Form 402 for licenses in the Operational Fixed Microwave Service. Authority for issuing the microwave licenses is contained in Volume V, Parts 90 and 94 of 47 CFR of the FCC Rules and Regulations, which govern private repeater stations.

STATE

The applicant is responsible for obtaining necessary grants, permits, and approvals from the following Wyoming state agencies.

Department of Environmental Quality (DEQ)

Any facilities that may cause emissions of air pollutants in Wyoming must obtain Air Quality Permits to Construct and Operate, as per Section 21 of the DEQ, Wyoming Air Quality Standards and Regulations.

Subsurface discharges to ground water, other than those discharges associated with the production of oil and gas cov-

ered under the Wyoming Oil and Gas Conservation Commission's program, require Wyoming Ground Water Pollution Control/UIC (Underground Injection Control) Permits.

Any project involving construction, installation, or modification of a sewerage system, treatment works, disposal system, or other facility capable of causing or contributing to pollution requires a Permit to Construct, Install, or Modify Public Water Supplies and Wastewater Facilities.

Processing plant surface water discharges (i.e., if not a zero-discharge facility), hydrostatic test water, sanitary wastewater, and any other potential project water discharges would require National Pollutant Discharge Elimination System (NPDES) permits for discharges into state waters.

State Engineer

A Permit to Appropriate Ground Water must be obtained from the State Engineer prior to initiation of water well construction. Temporary Water Rights for Construction and Permits to Appropriate Surface Water must be obtained from the State Engineer if the applicant plans to appropriate surface water for construction, hydrostatic testing, or operation.

Wyoming statutes require that Approvals for Water Supply Facilities, Wastewater Disposal Facilities, Retention Ponds, and Other Facilities be obtained from the State Engineer before construction begins on any development involving the use of water within Wyoming.

State Board of Land Commissioners

The state has permitting authority over state lands regarding ROWs or other uses of property or resources on state lands. The applicant would be required to obtain Easements for Right-of-Way for all state lands potentially affected by the proposed project.

Public Service Commission

A Certificate of Public Convenience and Necessity would be needed from the Public Service Commission for the power transmission line and possibly for the plant and pipelines. The commission will be contacted by the applicant to ascertain what specific project components would require a certificate.

State Highway Department

Any pipelines crossing or otherwise encroaching on state highway ROWs would require a Utility Crossing Permit from the State Highway Department, Rock Springs District.

LOCAL JURISDICTIONS

Lincoln County

Under Lincoln County's Land Development and Permit Process, a Zoning Certificate must be obtained from the Office of Planning and Development prior to the site development and construction. Approval for crossing county roads must be obtained from the county commissioners.

Uinta County

Uinta County's Land Use Resolution requires that a Zoning Certificate be obtained for aboveground facilities developed in Uinta County. Approval for crossing county roads must be obtained from the county commissioners.

Private Landowners

Permission to cross private lands would need to be obtained from appropriate landowners.

SCOPE OF ANALYSIS

GEOGRAPHIC AREA OF INFLUENCE

Baseline data were compiled for each resource topic in geographic areas of influence determined for the impact analysis. These geographic areas of influence are defined and summarized for each resource topic in Chapter 2. Generally, these areas of influence included:

- The area in the immediate vicinity of the proposed plant site and other project components.
- A larger area of influence that extended beyond sites of surface disturbances and construction activities to a distance where impacts could no longer be identified with the project. For many resources (e.g., recreation, air quality, socioeconomic conditions), this larger area extended a considerable distance beyond construction sites and designated ROWs.

IMPACT ANALYSIS GUIDELINES

In accordance with CEQ regulations, impact assessments were conducted for each resource topic in order to provide sufficient analysis for determining whether the proposed action or alternatives would result in significant impacts to the environment. In order to provide a framework for analysis of potential impacts, indicators of impact significance are presented for each resource topic in Chapter 3. The intent of these indicators is to provide a quantitative or semiquantitative threshold value beyond which significant impacts may be indicated. If threshold values are approached or exceeded, then a more detailed analysis and professional judgment are required to reach a determination as to whether significant impacts would occur. Indicators of significance are therefore used to define potential impact topics warranting detailed analysis and to focus on the necessary level of effort required for analysis and determination of impact significance.

Impacts that would result from the Road Hollow project were evaluated assuming baseline conditions in defined geographic areas of influence as they would exist when Road Hollow would start construction in the summer of 1983. Thus the determination of availability and condition of existing resources, used as a base for comparison and evaluation of impacts, takes into account the effects

of existing projects and management plans.

Cumulative impacts that may result from the incremental additive and/or interactive effects of Road Hollow in combination with reasonably predictable future projects were also assessed. Reasonably predictable future projects are defined as projects that are clearly entrained in a development cycle (approved and permitted or in a permitting stage) and that would be initiated after the beginning of Road Hollow construction in the summer of 1983. Only those projects that would result in impacts to the same geographic area of influence defined for the Road Hollow project were included in the cumulative analysis. A list of these projects is provided in Appendix A.

RELATIONSHIP TO OTHER DOCUMENTS

Several recently completed Environmental Assessments address the area that would be affected by the proposed action and alternatives. Examples of these documents include those for Northwest Pipeline Company's Bear River Divide Trunk A; MAPCO's Northwest Lateral, Whitney Canyon, and Carter Creek natural gas processing projects (including supplements); Pioneer Trails Management Framework Plan and the Kemmerer Resource Area Oil and Gas Leasing Environmental Assessment Record (Kemmerer EAR). Appropriate sections of these completed EAs have been incorporated by reference, where applicable, rather than repeated in this EA for the Road Hollow project.

Drilling and completion of the gas wells that would supply the proposed gas treatment plant have been analyzed by the Minerals Management Service (MMS) in an EA which is incorporated into this EA by reference (MMS 1982). The MMS EA addresses impacts that would be associated with drill pads and access roads to the drill pads. The EA is available for

review in the BLM Rock Springs District and Kemmerer Resource Area offices.

SUMMARY AND COMPARISON OF IMPACTS FOR ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A summary of impacts is presented in Table 1-3 for comparison of project component alternatives, including the proposed action. Information presented in this table is based on the analysis of impacts in Chapter 3. Impacts described in Table 1-3 include those identified as important and those that provide meaningful information for a comparison of alternatives. Other, less important impacts, are discussed in Chapter 3, in the technical reports prepared for Socioeconomic Conditions and Wildlife, and in technical files for the other resources.

In addition to Table 1-3, a narrative summary of positive and negative impacts is presented below for the mitigation alternative of fencing the proposed eastern access and sulfur haul road. Potential benefits associated with fencing of the proposed access and sulfur haul road include:

- Limiting livestock road-kills in the permanent ROW
- Limiting the potential for injury to humans and the liability associated with animal-vehicle collisions
- Control of off-road-vehicle (ORV) access and potential disturbance to lands outside the permanent ROW
- Reduction of access to sensitive cultural and paleontological resources on lands adjacent to the ROW by controlling ORV activity
- Improvement in the chances for successful rehabilitation within the permanent ROW by excluding damage to vegetation by livestock

Adverse impacts associated with fencing of the ROW include:

Table 1-3. SUMMARY AND COMPARISON OF IMPACTS FOR ALTERNATIVES INCLUDING THE PROPOSED ACTION

	Plant Site	Gathering Lines		Sales Gas Pipeline Routes			Condensate-NGL Routes		Access Road Routes	
	Proposed Action	Proposed Action	Alt.	Proposed Action	Alt. Route 1	Alt. Route 2	Proposed Action	Alt. Route 1	Proposed Action	Alt. 1
<u>Air Quality</u>										
SO ₂ emitted (t/yr)	49.0									
<u>Geology</u>										
ROWs with high potential for landslides	NA	Mod.-Low	Mod.-Low	Mod.-Low	High	High	High	High	Mod.	Low
<u>Paleontology</u>										
Miles of ROW across areas of high sensitivity	0	3.6	4.0	0	0	10.0	0	0	2.8	0
<u>Soils</u>										
Soil erosion susceptibility after removal of veg. cover										
- Stable (ROW miles)	-	-	-	-	-	-	-	1.25	1.0	-
- Slight (ROW miles)	-	-	0.55	4.55	13.0	9.5	16.6	24.6	1.5	4.25
- Moderate (ROW miles)	40 ac	11.0	8.85	3.25	4.5	8.0	4.2	7.95	20.0	3.15
<u>Water Resources</u>										
Impacts to water quality ^a	N ^b	0.15	0.15	0.22	1.15	1.23	2.44	8.65	21.4	0.015
<u>Vegetation</u>										
Miles of ROW crossing aspen forest		0.6	0.9	0.2	0.7	0	1.3	2.0	0	0
Miles of ROW crossing sagebrush/serviceberry shrubland		2.2	0.1	0	3.8	2.4	3.9	8.6	1.6	0
<u>Wildlife</u>										
Miles of ROW crossing crucial winter/year-round mule deer range	0	0	0	0	0	0.5	0	0	12.3	0
Number of sage grouse strutting grounds within 1.25 miles (perpendicular lateral distance to the center of a strutting ground) of a project component	0	0	0	0	0	0	0	0	11	0
Number of golden eagle (GE) or prairie falcon (PF) nests within 1.25 miles (perpendicular lateral distance) of a project component	0	0	0	0	0	0	0	0	1 (GE)	0
<u>Livestock and Range</u>										
Estimated AUM loss per year ^c (short term/long term)	7.8/7.8	8.8/0	7.1/0	3.4/0	7.8/0	6.6/0	17.8/0	25.9/0	68/26	11.4/11.4
Estimated percentage of total AUMs within a grazing allotment that would be removed on a long-term basis	0.01	0	0	0	0	0	0	0	0.04	0.02
Miles of lambing areas crossed	0	0	0	0	0	10.0	0	0	7.5	9.0
<u>Cultural Resources</u>										
Potential for impacts ^d to Oregon Trail variants	Med.	High	High	Med.	Med.	High	Med.	Med.	High	Med.
Number of prehistoric or historic sites (excluding the Oregon Trail) within a designated construction ROW ^e	Low	Low	Low	Low	Low	Med.	Low	Low	High	Low
<u>Visual Resources</u>										
Highest contrast identified for visual features (20 is maximum contrast allowed for BLM VRM Class IV)	19	0	0	5	5	18	5	5	18	0
<u>Recreation</u>										
Number of recreation activities affected (e.g., hunting, hiking, camping)	3	0	0	0	0	1 (Oregon Trail)			3	
<u>Transportation</u>										
Number of miles of roadway subject to increased wear and maintenance	30	NA	NA	0	0	0	0	0	30	65
<u>Socioeconomics</u>										
Estimated ad valorem revenues on real property	345,500	6300	5400	11,100	23,500	25,800	22,200	35,500	Incl. under plant site	Incl. under plant site

Table 1-3. SUMMARY AND COMPARISON OF IMPACTS FOR ALTERNATIVES INCLUDING THE PROPOSED ACTION (concluded)

	Proposed Action	Processing and Disposal of H ₂ S					Water Supply		Electrical Supply	
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Proposed Action	Alt. 1	Proposed Action	Alt. 1
<u>Air Quality</u>										
SO ₂ emitted (t/yr)	49.0					54.0				
<u>Geology</u>										
ROWs with high potential for landslides	Mod.	Low	Low	Low/Mod.	Low/Mod.	Low/Mod.	NA	Mod-Low	Low	Mod-Low
<u>Paleontology</u>										
Miles of ROW across areas of high sensitivity	2.8	0	0	2.8	0	2.8	0	0	0	0
<u>Soils</u>										
Soil erosion susceptibility after removal of veg. cover										
- Stable (ROW miles)	1.0	—	—	R ^b	R ^b	R ^b	NA	4.55	0.05	4.25
- Slight (ROW miles)	1.5	4.25	4.25	7	7	7		3.25	1.95	3.15
- Moderate (ROW miles)	20.0	3.15	3.15							
<u>Water Resources</u>										
Impacts to water quality ^a	0.026	0.005	0.115	NE ^b	N ^b	NE ^b	N ^b	0.10	0.2	0.10
<u>Vegetation</u>										
Miles of ROW crossing aspen forest	0	0	0	0	0	0	0	0.2	0.1	0.2
Miles of ROW crossing sagebrush/serviceberry shrubland	1.6	0	0	1.6	0	0	0	0	0	0
<u>Wildlife</u>										
Miles of ROW crossing crucial winter/year-round mule deer range	0	0	2.8	0	0	0	0	0	0	0
Number of sage grouse strutting grounds within 1.25 miles (perpendicular lateral distance to the center of a strutting ground) of a project component	4	0	0	4	0	0	0	0	0	0
Number of golden eagle (GE) or prairie falcon (PF) nests within 1.25 miles (perpendicular lateral distance) of a project component	0	0	0	0	0	0	0	0	0	0
<u>Livestock and Range</u>										
Estimated ALM loss per year ^c (short term/long term)	68/26	11.4/11.4	11.4/11.4	R ^b	R ^b	R ^b	0	3.4/0	.1/0	3.3/0
Estimated percentage of total ALMs within a grazing allotment that would be removed on a long-term basis	0.04	0.02	0.02	R ^b	R ^b	R ^b	0	0	0	0
Miles of lambing areas crossed	7.5	9.0	9.0	R ^b	R ^b	R ^b	0	0	0	0
<u>Cultural Resources</u>										
Potential for impacts to Oregon Trail variants ^d	High	Med.	Med.	High	Med.	Med.	Low	Med.	Med.	Med.
Number of prehistoric or historic sites (excluding the Oregon Trail) within a designated construction ROW ^e	High	Low	Low	Low/High	Low/High	Low	Low	Low	Low	Low
<u>Visual Resources</u>										
Highest contrast identified for visual features (20 is maximum contrast allowed for ELM VRM Class IV)	18	0	0	0	0	0	0	5	0	14
<u>Recreation</u>										
Number of recreation activities affected (e.g., hunting, hiking, camping)	1 (Oregon Trail)			1 (Oregon Trail)		1				
<u>Transportation</u>										
Number of miles of roadway subject to increased wear and maintenance	22.5	7	30	30	0	22.5	0	0	0	0
<u>Socioeconomics</u>										
Estimated ad valorem revenues on real property	NA	NA	NA	NA	NA		5550	1400	1300	

^a A composite index for evaluating the relative water quality impacts of the alternatives involving either disturbance along linear routes or transportation along linear corridors was developed. The three terms included in the index are: (1) the total average of disturbed area, DA; (2) the total length of the route in miles, L; and (3) the average distance in feet to identified drainages, DD. The index (see the Water Resources section in Chapter 3 for a detailed discussion of the index) was constructed from these three terms as follows:

$$\text{Water Quality Index} = \frac{(DA)(L)}{(DD)}$$

^b N = Negligible

NE = Not evaluated — See Chapter 3 for discussion of potential impacts and Appendix F for discussion of index.

^c Estimated ALMs are based on the average of cattle and sheep ALMs.

^d Low — would not contact

Medium — would contact, but not in sections with well preserved wagon ruts

High — would contact in sections with well preserved wagon ruts

^e Low — 0-2 sites, none of which is eligible for National Register

Medium — 3-9 sites, none of which is eligible for National Register

High — 10+ sites, or 1 or more sites recommended as eligible for National Register

^f Revenues were estimated for the year following completion of the project component.

^g Impacts would be as listed for the proposed action or alternative 1/alternative 2 under Processing and Disposal of H₂S.

NA = Not applicable

- A loss of AUMs available to livestock within the fenced ROW
- Restriction of daily movement patterns of livestock grazing in the vicinity of the ROW
- Increases in estimated costs to complete the proposed access and haul road
- Injury to or destruction of an undetermined number of some animals such as mule deer or antelope

MITIGATION MEASURES NOT INCLUDED IN THE
PROPOSED ACTION, ALTERNATIVES, OR
APPLICANT-COMMITTED PRACTICES

Standard BLM stipulations would be applied to the various ROWs needed for the proposed facilities. These standard stipulations are considered part of the proposed action for the purposes of this EA. The stipulations are normally applied to ancillary facilities such as pipelines, pole powerlines, roadways, and temporary use permits. The list of standard stipulations is contained in the EA for the Whitney Canyon and Carter Creek projects (BLM 1980) and is on

file at the Kemmerer Resource Area office.

In addition to these standard stipulations, several special stipulations would be needed to mitigate impacts to crucial wildlife use areas. Based on BLM or state resource management planning documents, analysis in this EA, and consultations with area biologists, the BLM and the applicant will develop a Plan for Operation that includes such stipulations as specific dates and/or areas to avoid during construction. The purpose of these stipulations is to mitigate potential impacts to crucial wildlife areas during crucial use periods. The Construction, Operation, and Maintenance Plan and stipulations would be a condition of the ROW Grant. The list presented in Table 1-4 generally indicates specific dates during which construction should be avoided or areas where proposed or alternative facilities should be relocated. Once the stipulations are specified in the Construction, Operation, and Maintenance Plan, only the Authorized Officer can authorize modifications.

Table 1-4. CRUCIAL WILDLIFE USE AREAS AND PERIODS TO AVOID DURING CONSTRUCTION OF THE PROPOSED ACTION OR ALTERNATIVES

Mileposts	Crucial Wildlife Use Areas	Stipulation ^a
<u>Proposed Eastern Access and Sulfur Haul Road</u>		
8.5, 20.9	Sage grouse strutting ground	Reroute proposed road to 1/4 mile from center of strutting ground
14.3, 18.5, 20.3, 21.7	Sage grouse strutting ground	Avoid construction March 1-June 15
<u>Alternative Condensate-NGL Pipelines to Divide Junction</u>		
29.6-32.4	Mule deer crucial winter range	Avoid construction December 15-April 1

^aOnce the stipulations are specified in the Construction, Operation, and Maintenance Plan, only the Authorized Officer can authorize modifications.

Chapter 2

AFFECTED ENVIRONMENT

This chapter provides information for the portion of the environment that, based on analysis, would be affected by the proposed action or alternatives. The affected environment for the proposed action and alternatives was analyzed for the following resources:

- Climate, air quality, and noise
- Geology (including geologic hazards) and mineral resources
- Paleontological resources
- Soils (including prime and unique farmlands)
- Water resources
- Vegetation
- Wildlife
- Aquatic resources
- Livestock and range
- Cultural resources
- Visual resources
- Recreation and wilderness resources
- Transportation
- Socioeconomic conditions

The amount of detail presented for each resource topic is commensurate with the anticipated level of impacts. Thus the affected environment is described in greater detail where more important impacts are expected and in less detail where less important impacts are expected. Technical reports were prepared for two resource topics (wildlife and socioeconomics) for which the largest number and greatest magnitude of impacts are anticipated. These reports are available for review at the BLM Kemmerer Resource Area office and the BLM Rock Springs District office.

Baseline data were compiled from existing sources for each resource topic in geographic areas of influence determined by the impact analysis in Chapter 3. These geographic areas of influence for each resource are defined and summarized below for each resource topic.

Resource topics are discussed under the headings for the proposed action and alternatives. In accordance with CEQ regulations to reduce the size of these discussions, descriptions of the affected environment are not repeated for alternatives if the environment is similar to that of the proposed action.

In addition to resource topics listed above, several other items were considered in the environmental analysis. None of the following items occur in the geographic area of influence for this EA and therefore no further analysis of impacts was conducted.

- Wetlands
- 100-year floodplains
- Prime or unique farmlands
- Wilderness values, including wilderness study areas
- Areas of Critical Environmental Concern (ACECs)
- Prime or sole source of drinking water
- Wild or scenic rivers

CLIMATE, AIR QUALITY, AND NOISE

Geographic Area of Influence

The area within a 31-mile (50-km) radius of the proposed plant site was

examined with respect to potential project-related impacts that may decrease the existing air quality. A 31-mile radius was used because dispersion models are generally not accurate at greater distances. Data obtained from state of Wyoming meteorology and air quality stations near the proposed project site were used to define the existing meteorology and air quality discussed below.

Proposed Action

Climate and Meteorology. The general climate of the geographic area of influence is classified as continental. The area is relatively cool and semiarid, lying to the east of major terrain obstacles to the prevailing wind flow. The mean annual precipitation for the region ranges from 8.6 inches at Kemmerer to 10.6 inches at Fort Bridger (DOC 1965). Snowfall occurs 9 months of the year, with the greatest amount, 8.8 inches, measured at Sage, in January (DOC 1965). The annual average temperature at Kemmerer is 39.3°F, with January, the coldest month, averaging 17.8°F, and July, the warmest month, averaging 62.71°F (DOC 1965). At 7900 feet the temperature at the project site would be less than that observed at the lower elevation in Kemmerer.

Meteorological conditions for the dispersion of pollutants are typically good. Rock Springs has moderately strong winds averaging 10 to 14 mph, occurring from the western quadrant 62 percent of the time.

Existing Air Quality. The proposed plant site lies within the Wyoming Intra-state Air Quality Control Region (AQCR), as designated by the U.S. Environmental Protection Agency (EPA). National Ambient Air Quality Standards (NAAQS) and the standards of the Wyoming Department of Environmental Quality (DEQ) are shown in Table 2-1. Ambient pollutant concentrations have been monitored at a number of locations around the project site by the DEQ.

Measurements of total suspended particulate matter (TSP) made at Granger and Evanston are summarized in Table 2-2. Typical of many arid and semiarid regions, concentrations in excess of the particulate standard have been observed at both sites due to naturally occurring fugitive dust. This is recognized by the EPA in its Fugitive Dust policy, which states that in rural areas particulates of fugitive origin, such as natural wind-blown dust, are of much less concern than those of nonfugitive origin. As such, with the exception of an industrial area in Sweetwater County, the EPA has designated the entire state of Wyoming as being in attainment ("better than the national standards") for TSP.

Levels of sulfur dioxide (SO₂) and nitrogen dioxide (NO₂) were monitored in Kemmerer by the DEQ. Results of these measurements are summarized in Table 2-3. All levels of both SO₂ and NO₂ reported were well below any applicable standard and were generally at or near the detection level of the analyzers. The entire state of Wyoming has been classified as being in attainment for both SO₂ and NO₂ by the EPA.

No measurements of carbon monoxide (CO) or H₂S have been made in the project area. Background levels of CO at the project site are expected to be less than 1.0 part per million (ppm), which is the minimum detection limit for most CO monitors. Similarly, levels of H₂S are expected to be near zero.

Noise. At present, there are no noise measurements for the project area of influence. However, similar rural sites have noise levels of from 35 to 40 decibels, L_{dn} scale (EPA 1974). These levels should be representative of the general project region.

Alternatives

The general climate, air quality, and background noise levels for alternative project components are the same as discussed for the proposed action.

Table 2-1. NATIONAL AND WYOMING STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	National Primary Standard ^a	National Secondary Standard ^a	Wyoming ^a Standard
Total Suspended Particulates			
Annual geometric mean	75	60	60
24-hour maximum	260	150	150
Sulfur Dioxide			
Annual arithmetic mean	80	b	60
24-hour maximum	365	b	260
3-hour maximum	b	1300	1300
Carbon Monoxide			
8-hour maximum	10 mg/m ³	10 mg/m ³	10 mg/m ³
1-hour maximum	40 mg/m ³	40 mg/m ³	40 mg/m ³
Nitrogen Dioxide			
Annual arithmetic mean	100	100	100
Photochemical Oxidants (Ozone)			
1-hour maximum	240	240	240
Hydrogen Sulfide (H ₂ S)			
0.5-hour average	b	b	70 ^c
0.5-hour average	b	b	40 ^d

Note: concentrations in $\mu\text{g}/\text{m}^3$ unless otherwise noted.

^aNational standards, except those based on annual averages or annual geometric mean, are not to be exceeded more than once per year.

^bNo standard.

^cStandard not to be exceeded more than two times per year.

^dStandard not to be exceeded more than two times in any 5 consecutive days.

Table 2-2. TOTAL SUSPENDED PARTICULATES ($\mu\text{g}/\text{m}^3$)

	Granger			Evanston		
	1979 ^a	1980 ^b	1981 ^c	1979 ^a	1980 ^b	1981 ^c
Maximum 24-Hour	165	188	248	184	217	266
Second-Highest 24-Hour	138	161	186	177	205	178
Annual Geometric Mean	44.2	43.93	53.60	57.2	66.37	74.42

^aDEQ 1980.

^bDEQ 1981.

^cDEQ 1982.

Table 2-3. CONCENTRATIONS OF SULFUR DIOXIDE AND NITROGEN DIOXIDE OBSERVED AT KEMMERER, 1976-1978 ($\mu\text{g}/\text{m}^3$)

	1976	1977	1978
Sulfur Dioxide ^a			
24-hour ^b	5	3	5
Annual ^c	1	<1	1
Nitrogen Dioxide			
Annual ^c	7	<1	9

Note: Measurements made by Wyoming DEQ using gas bubblers. Monitors discontinued after 1978.

^aThree-hour averages were not reported.

^bMaximum 24-hour average.

^cMean annual average.

GEOLOGY AND MINERALS

Geographic Area of Influence

A 35-mile (60-km) radius around the Road Hollow Unit boundary was selected as the geographic area of influence. This area encompasses the major geologic structures, seismicity, and stratigraphy that have the potential to affect the proposed site or related components. For example, large earthquakes outside this region would not dominate over potential earthquakes within it.

Proposed Action

General. The Road Hollow Unit Area and the proposed project facilities are located almost entirely within the Fossil Basin, a depositional depression in the Overthrust Belt of southwestern Wyoming. During Tertiary time, the Fossil Basin filled with sediments that covered some of the overthrust features in the basin. While the compressional forces that caused the thrusts appear to have abated in this region (BLM 1979), they have been replaced by extensional forces responsible for normal faulting that is the more recent style of deformation (Armstrong and Oriel 1965). The topography in the Unit Area is largely formed of steep-sided buttes and mesas; thus both pipelines and roads would cross steep slopes. Erosion of the geologic formations in this region has produced landslide-prone slopes in some areas. In other areas, oversteepening of slopes to provide access roads may increase the potential for landslides.

Geologic Hazards. Based on a review of the earthquake catalogue of Abarasz and McKee (1979) for the 128-year period from 1850 to 1978, 107 earthquakes have occurred within the geographic area of influence (35-mile radius) of the Road Hollow Unit. One of these earthquakes (originating from the Bear Lake Fault) registered 6.3. All of the other earthquakes registered 3.9 or less and approximately half were microearthquakes, i.e., less than 2.0. The distribution of historical

earthquakes within the region of the Road Hollow Unit includes a somewhat diffuse cluster to the west and northwest and an obvious linear trend of epicenters to the northeast. Possible sources of seismic hazards within the Unit Area are an alignment of microearthquake epicenters to the east and northeast of the unit and the Bear Lake, Collett Creek, Whitney Canyon, and Rock Creek faults. The Bear Lake and Rock Creek faults have had reported historic activity (Abarasz and McKee 1979; Rubey et al. 1975; Witkind 1975). The linear trend of epicenters northeast of the Unit Area developed entirely between July 1962 and June 1978 (Abarasz et al. 1979). Dickey (1982) and Witkind (1975) report only Quaternary activity for the Collett Creek Fault. This fault trends southwest from an area approximately halfway between Sage and Nugget. Observations during aerial reconnaissance and air photo interpretation indicate that scarps along the Whitney Canyon Fault are likely formed by erosion along an older fault.

The Rock Creek Fault is nearer the site than the other possible sources. It is an active, high angle, normal fault that dips to the west and is at least 24 miles long (Witkind 1975; Rubey et al. 1975). Geomorphically young scarps in Holocene alluvial debris have been observed along the fault trace a few miles north of Nugget. The trace of the fault enters the Unit Area from the north, extends to within 5 miles of the site, and projects slightly to the west of the site. This trace also exhibits a young geomorphic expression, as observed during recent aerial overflights. The projection of this feature nearer to the site is covered by unfaulted Quaternary landslides, and thus movement of the fault at this location predates the landslides. An evaluation of fault characteristics suggests that the Rock Creek Fault may be capable of generating a maximum magnitude (Ms) 6-1/2 to 7 earthquake, which could produce horizontal ground accelerations in the range of 0.35-0.45g. This is

approximately equivalent to a Modified Mercalli epicentral intensity IX (Appendix B). Analysis of historical seismicity and examination of scarp morphology suggest that the recurrence interval of a maximum magnitude earthquake on the Rock Creek Fault may be on the order of several hundred to two thousand years. An earthquake of this magnitude on the Rock Creek Fault at its closest approach to the site is capable of causing damage to project facilities by surface rupture or seismic shaking. Surface rupture or seismic shaking may also trigger potential rock avalanches or landslides in the region (Rubey 1975).

It is not known at this time if the linear trend of microearthquake epicenters northeast of the Unit Area represents a throughgoing fault with active surface faulting. This alignment of events at its nearest approach to the proposed site is approximately 14 miles to the east. The regional seismicity, and in this case the length of the lineation, suggest that a maximum magnitude 6-1/2 could possibly occur along this trend. It is estimated that an earthquake of this size at the closest approach to the site could generate a horizontal acceleration of approximately 0.20g.

Few landslides or rock avalanches were observed during the air photo interpretation or the aerial reconnaissance, and those observed were outside the Unit Area. However, several authors (BLM 1979; Dickey 1982; Osterwald et al. 1977) report a high incidence of landsliding involving the contact between the Wasatch and Green River formations in the Wyoming overthrust, and Rubey (1975) suggests that exposure of the bentonitic mudstones of the Wasatch Formation provides unstable conditions. Several project components would be located, at least in part, on or below steep slopes formed by erosion of the Wasatch or Green River Formation, and some would cross the contact between these formations. Project

components in these areas are susceptible to damage.

Minerals. In the geographic area of influence for the Road Hollow Unit, there are proven economic reserves of oil, gas, coal, trona, phosphate, and aggregate. Descriptions of these resources are provided in the Kemmerer EAR (BLM 1979). None of these economic reserves are located in areas where recovery would be prevented by construction or operation of project facilities.

Alternatives

Alternatives lie in the same geographic area of influence as the proposed action.

PALEONTOLOGICAL RESOURCES

Geographic Areas of Influence

Implementation of the proposed action or any alternatives may result in impacts to paleontological resources within two geographic areas of influence. The "proposed project area," or the area of direct impact, consists of all areas where ground disturbance would occur as a result of construction, operation, and maintenance of project components. The second geographic area of influence is the area where indirect impacts such as vandalism, theft, or destruction by off-road vehicles, are expected to occur. This area includes the proposed project area and the region surrounding it; it is roughly equivalent to the recreation resource base, defined as the zone within a 100-mile radius of the expected communities of residence for the project-related work force.

Overview

The proposed Road Hollow project area is near the geographic center of Fossil Basin, a small, north-south-trending synclinal trough. Approximately 53 million years ago (early Eocene time) the basin contained a large lake, called Fossil Lake. A great variety of animals and plants lived in the lake and surrounding

area, and their remains have been preserved as fossils in the ancient sediments of the basin. The remains of these life forms, together with indirect evidence of their existence (footprints, burrows, etc.) compose paleontological resources.

Research on the paleontological resources of Fossil Basin has been conducted for more than 100 years (Grande 1980). The preservation, abundance, and diversity of the fossils from this area are exceptional and present significant scientific research opportunities. In recognition of the significance of this resource, Fossil Butte National Monument (Map 1-1) was established in 1974 to preserve for "present and future generations outstanding paleontological sites and related geological phenomena, and to provide for the display and interpretation of scientific specimens" (Public Law 92-537).

Only limited paleontological research has been conducted in the proposed project area, and the specific nature of the paleontological resources and their locations within the area are unknown. As part of a current research project on the geology and paleontology of Fossil Basin, seven small quarries have been excavated in the general project area to investigate types of fossils and their stratigraphic occurrence. Fossils found in these quarries indicate that the abundance and diversity of the paleontological resources of the area may be far greater than those to the north in the National Monument and adjacent areas (Fremd 1982).

Proposed Action

The area of the proposed action and alternatives is underlain by rocks of several different geologic units (Rubey et al. 1975; Love et al. 1955; BLM 1966). Brief descriptions of the age, lithology, environment of deposition, reported fossils, and sensitivity of each unit to project-related impacts are provided in Table 2-4. The locations of these geo-

logic units within the proposed project area are not accurately known, since detailed geologic mapping is available for only a small northern portion of this area (the area within T21N, R118W) (Rubey et al. 1975).

Two geologic units within the proposed project area have been identified as having a high sensitivity to project-related impacts; these units contain significant fossils that may be adversely affected as a result of the proposed action. The units are the Fossil Butte Member of the Green River Formation, the primary source of the rich paleontological resources of Fossil Basin, and portions of the Wasatch Formation, which has been a rich source of mammalian fossils.

Information available on the stratigraphy of the proposed project area (Rubey et al. 1975; Fremd 1982) indicates that ridgetops in the central and southern portions of the area (south of Elk Mountain to approximately the Lincoln-Uinta county line) are composed of rocks assigned to the Angelo Member of the Green River Formation, and thus are located stratigraphically above the fossiliferous beds of the Fossil Butte Member. Bedrock on the ridgetops may also be obscured by soils of several feet or more in thickness. Project components that are restricted to these ridgetops are the plant site; the gas gathering pipelines for wells 4, 7, 8, and 12, and the sales gas pipeline.

Ridgetops in the northern portion of the proposed project area, and areas below the ridgetops to the south, are largely composed of bedrock of the Fossil Butte Member of the Green River Formation and the Wasatch Formation. Bedrock may be obscured by Quaternary (recent) stream and landslide deposits along valley floors, but it is exposed on the steep slopes that rise above the valleys. Project components that are located in these areas are the gas gathering lines for wells 9, 10, 11, and 13; the electric power transmission line; the eastern

Table 2-4. SUMMARY OF GEOLOGY AND PALEONTOLOGY

Geologic Unit (Group, Formation or Member)	Age	Lithology	Environment of Depo- sition	Fossils	Sensitivity ^a
Green River Formation, Angelo Member	Early middle Eocene	Bluish white weathering shale, siltstone, and limestone; tan limestone, grayish green claystone	Continental, lacustrine	Similar to Fossil Butte Member (below), but far less abundant and often poorly preserved (Oriol and Tracey 1970)	Moderate
Green River Formation, Fossil Butte Member	Early middle Eocene	Buff limestone and marl- stone, brown oil shale, gray siltstone and clay- stone	Continental, lacustrine	High diversity of abundant, well-preserved fossils; includes 31 species fish; 5 species turtles; 4 species crocodilians; 21 species birds; 2 species mammals; numerous insects, mollusks, plants (McGrew and Casil- liano 1975, Fremd 1982)	High
Wasatch Formation	Early to middle Eocene	Predominantly mudstone of red, yellow, green, brown, gray color; includes sand- stone, limestone, and conglomerate beds	Continental, fluvial, alluvial, lacustrine	Diverse vertebrates, in- cluding at least 20 genera and 20 species of mammals (McGrew and Casilliano 1975)	High
Evanston Formation	Paleocene and Upper Cretaceous	Boulder-conglomerate beds; carbonaceous sandstone, claystone, and siltstone; lignite, and sparse coal beds	Continental, fluvial, paludal	Plant remains, inverte- brates; rare vertebrates, including jaw fragment of Triceratops and 14 genera of Paleocene mammals (Gazin 1969)	Moderate

Table 2-4. SUMMARY OF GEOLOGY AND PALEONTOLOGY (concluded)

Geologic Unit (Group, Formation or Member)	Age	Lithology	Environment of Depo- sition	Fossils	Sensitivity ^a
Adaville Formation	Upper Cretaceous	Interbedded gray sand- stone, siltstone, carbon- aceous clay, and shale	Continental, paludal	Plant remains, inverte- brates (Rubey et al. 1975)	Low
Hillard Shale	Early Upper Cretaceous	Tan to gray claystone, partly lignitic sandy siltstone, sandstone, and bentonite	Marine, nearshore	Abundant mollusks (Rubey et al. 1975)	Low
Gannett Group	Lower Cretaceous	Red sandy mudstone with limestone beds; red mudstone, crossbedded sandstone, and massive conglomerate	Continental, fluvial and lacustrine; and marine, nearshore	Plant remains, ostracods (Eyer 1969)	Low

^aSensitivity ratings are defined in Chapter 3.

access road; and the condensate and NGL pipelines.

Alternatives

Alternatives that are underlain by bedrock of the Fossil Butte Member or the Wasatch Formation would be gas gathering pipelines for wells 9 and 10; sales gas pipeline alternatives 1 and 2; and condensate and NGL pipeline alternative 1. The remaining alternatives would be restricted to ridgetops that are underlain by Angelo Member rocks.

SOILS

Geographic Area of Influence

Direct impacts to the soils resource would occur primarily on areas directly disturbed (e.g., plant site, pipeline and transmission line ROWs, and access/haul roads) during construction, operation, and maintenance of the proposed action or alternatives.

Indirect impacts to the soils resource could result from increased off-road vehicle (ORV) access to previously inaccessible areas.

Proposed Action

The proposed project components are primarily within the Northern Rocky Mountains portion of the Rocky Mountain Range and Forest Region (Soil Conservation Service [SCS] 1978). Annual precipitation in the project region generally ranges from 8 to 12 inches.

The five soil types (subgroups) identified along/within the proposed project components are listed by soil type and milepost (MP) or acreage in Table C-1 in Appendix C. Interpretations of selected soil characteristics are listed in Table C-3 in Appendix C. Interpretations of susceptibility to soil erosion (once vegetative cover is removed) for the proposed action are listed by MP or acreage in Table C-4 in Appendix C.

The soils potentially affected by the proposed action have resulted primarily

from weathering and erosion of sedimentary bedrocks (e.g., shale, sandstone, and conglomerate) on uplands. The identified soils range from very shallow to deep and are primarily moderately well to excessively drained. Surface textures are primarily sandy, loamy, and clayey. Rock outcrops are present throughout the project region. Most of the identified soils are saline-alkaline, and topsoil availability is limited in many areas due to shallow surface layers. The terrain in areas potentially affected by the proposed action is primarily gently sloping to strongly sloping. Susceptibility to wind and water soil erosion is generally moderate. The vegetation in the project region is generally characterized by grasses and shrubs. The productivity of the identified soils is low to moderate. Livestock grazing, wildlife habitat, recreation, and energy development are the principal land uses in the project region.

Alternatives

Soil types, general and selected soil characteristics, and susceptibility to soil erosion are similar to that described for the proposed action. Further detail is presented in Appendix C (Tables C-2, C-3, and C-5).

WATER RESOURCES

Geographic Area of Influence

The geographic area of influence for surface-water impacts includes the drainage area that could be affected by project activities. Because of the ability of existing surface drainages to transport sediment and other contaminants from areas that would be disturbed by project activities, the potential exists for downstream users to be affected. Such effects would be limited in the Bear River Basin primarily to the downstream reaches of Bridger and Twin creeks before their confluence with the Bear River. In the Green River Basin, downstream effects would be limited to the downstream confluence of Little Muddy Creek and Albert Creek. With respect to ground-water resources, the area of impact would be

limited to the water resources found in the immediate vicinity of water supply wells or wells used for wastewater injection.

Proposed Action

A discussion of the regional water resources environment has been presented in two previous studies (BLM 1979, 1980). According to these documents, surface water in the affected areas drains into either the Bear River Basin or the Green River Basin. Tributaries of the Bear River that may be affected include Twin Creek, Clear Creek, Bullpen Creek, Bridger Creek, and Spring Creek. Tributaries of the Green River that may be affected include Little Muddy Creek, Road Hollow Creek, Chicken Creek, Pine Hollow Creek, Sheep Creek, Ryckman Creek, Shurtleff Creek, and Albert Creek. Generally, very little data on water quantity or quality are available for these streams.

Mean annual runoff in these streams is expected to range from 0.5 to 1 inch, compared with an annual average precipitation of 8 to 10 inches (Gordon et al. 1960). The seasonal variation in streamflow is generally large because of snowmelt effects. Streamflow increases during the snowmelt period from April to June and generally decreases until the next snowmelt period. For many of these streams, low flows are maintained by ground-water inflow. Generally, ground-water inflow is most important in the Green River Basin streams near the Bear River Divide. Water use is generally limited to livestock and wildlife watering.

Water quality and quantity measurements associated with selected potentially affected streams are shown in Table 2-5. Generally, the total dissolved solids (TDS) in surface streams near the proposed plant site area fall in the range (250-500 mg/l) predicted by Lines and Glass (1975). Levels of TDS tend to increase greatly in water collected from streams farther east of the

plant site, as shown by the quality of Little Muddy Creek. Total suspended solids levels tend to increase with flow. Lower-TDS waters tend to be mixed cation-bicarbonate waters, while higher-TDS waters tend to have higher sulfate and sodium levels.

The quantity and quality of ground water in the area has also been described previously (BLM 1979). According to Lines and Glass (1975), conglomerate and conglomeritic sandstone aquifers in the Wasatch and Evanston formations and the Gannet Group are capable of yielding moderate to large amounts of water to wells. Finer-grained sandstones in the Wasatch, Green River, and Fowkes formations will yield small quantities of water. Zones of perched water occur in these formations near the land surface; however, in topographic lows at depths greater than 100 feet, water is confined and some wells flow. Water at shallow depths in these sandstone and conglomerate aquifers is usually a calcium carbonate type and rarely contains more than 500 mg/l TDS.

Alternatives

Water resources in the area of project component alternatives are similar to those discussed for the proposed action.

VEGETATION

Geographic Area of Influence

The vegetation of the area included in a 10-mile-diameter circle centered on the plant site and a 2-mile-wide corridor centered on each proposed or alternative linear facility was evaluated for direct and indirect impacts.

Proposed Action

The vegetation of areas that would be potentially affected by the proposed action consists of six major types: sagebrush shrubland, perennial mat forb-grass, aspen forest, sagebrush-serviceberry shrubland, juniper woodland-sagebrush shrubland, and wet meadow. These types are typical of the project site region, which is transitional between

Table 2-5. WATER QUANTITY AND QUALITY CHARACTERISTICS OF POTENTIALLY^a AFFECTED STREAMS

Parameter	Albert Creek below Whitney Canyon Creek	Bridge Creek near Bear R.	Bear River at E. Sage Creek Junction	Twin Creek at Sage	Ryckman Creek near Glencoe
Date	3/28/78	4/15/74	1/27/77-9/22/81	3/7/58-9/16/81	7/9/80-9/1/81
Flow (cfs)	6	4	-	31(2.7-6.98)123	1.3(0.26-2.7)13
Total Dissolved Solids	383	388	-	606(319-2750)80	492(377-678)7
Conductivity (μ mhos/cm)	645	590	689(450-950)26	890(330-4000)154	820(630-1100)15
Temperature (°C)	8	16	9(0-21)25	7.5(0-22)155	9(0-22)15
Turbidity (JTU)	80	-	21(3.5-53)25(FTU)	214(1-5400)121	550(6-1100)2
Total Suspended Solids	147	-	-	580(18-8180)76	285(16-609)15
pH (SU)	8.3	8.3	8.0(7.4-8.7)25	8(5.7-9.2)86	8.7(8.4-8.9)15
Calcium	41	35	57(26-84)23	86(44-390)85	60(33-73)7
Magnesium	37	17	34(19-53)23	45(19-190)85	61(52-68)7
Sodium	41	33	40(27-68)23	53(25-300)84	34(25-42)7
Potassium	10	3	2.9(1-5)23	4(1-24)83	7.5(6.8-8.9)7
Bicarbonate/Carbonate	240	163	317(188-428)	281(160-910)71	-
Sulfate	87	120	49(20-75)23	230(130-1100)85	70(45-120)7
Chloride	41	25	45(20-83)23	34(11-240)85	44(41-52)7
Dissolved Oxygen	-	7.9	8.6(4-14)25	9.9(7.2-16.8)63	9.5(7.5-13)14
Biochemical Oxygen Demand (BOD)	-	0.8	1.9(1-3.5)15	2.9(0.6-9.8)55	3.2(1.5-4.9)6
Location	Lat. 41°32'58" Long. 110°35'33"	Lat. 41°46'37" Long. 111°04'20"	Lat. 41°46'38" Long. 111°04'22"	Lat. 41°48'36" Long. 110°58'12"	Lat. 41°33'38" Long. 110°39'30"

Table 2-5. WATER QUANTITY AND QUALITY CHARACTERISTICS OF POTENTIALLY^a AFFECTED STREAMS (concluded)

Parameter	Bell Creek near L. Muddy Creek	Little Muddy Creek near Glencoe	Road Hollow at Mouth	Chicken Creek above Road Hollow	Carter Creek at Mouth
Date	11/5/76	11/20/75-9/29/80	11/6/76	11/6/76	11/6/76-3/28/78
Flow (cfs)	0.01	18.4(0.93-343)109	0.07	0.29	1.5(0.96-2)2
Total Dissolved Solids	936	1270(401-2970)61	445	442	-
Conductivity (μ mhos/cm)	1720	1750(600-5500)117	660	520	773(745-800)2
Temperature (°C)	7	8(0-28)119	3.5	6.0	-
Turbidity (JTU)	-	147(1-5400)107	6.0	10.0	118(60-175)2
Total Suspended Solids	-	290(8-3680)75	28	84	-
pH (SU)	8.8	8(7.3-9.1)61	8.5	8.5	8.5(8.2-8.8)2
Calcium	47	173(52-400)61	64	76	69.5(69-70)2
Magnesium	110	71(1-140)61	44	43	46(42-50)2
Sodium	140	127(43-470)61	25	14	26(22-30)2
Potassium	34	7(1-18)61	2.7	2	3(2.3-3.8)2
Bicarbonate/Carbonate	606	212(34-460)47	266	301	335(310-359)2
Sulfate	160	730(170-1900)61	150	130	103(95-110)2
Chloride	150	39(15-93)61	21	19	23(22-24)2
Dissolved Oxygen	-	9.1(06.8-11.8)58	11.0	9.8	-
Biochemical Oxygen Demand (BOD)	-	2.6(0.8-6.2)56	-	-	-
Location	Lat. 41°34'51" Long. 110°40'22"	Lat. 41°34'54" Long. 110°33'42"	Lat. 41°39'42" Long. 110°48'08"	Lat. 41°39'37" Long. 110°48'10"	Lat. 41°37'40" Long. 110°42'32"

Source: EPA 1982.

^aListed streams are those for which data are available.

Notes:

- 1) All units are mg/l unless otherwise indicated.
- 2) For entries with more than one number, the first number is the mean value, the second is the range of values, and the third is the number of measurements taken.
- 3) FTU = Formazin Turbidity Units.

lower-elevation Great Basin and higher-elevation montane areas. The distribution of these types is determined by a variety of environmental factors, including topography, aspect, slope, elevation, light, moisture, soil characteristics, land use history, and additional factors. More detailed information on the characteristics of major vegetation types is presented in the Wildlife Technical Report (wildlife habitat types).

No federal listed or proposed threatened or endangered plant species are known to occur in the geographic area of influence. A species that is under status review (Class 3c) by the U.S. Fish and Wildlife Service for proposal, Physaria condensata (Dense twinpod) has been recorded in the general region surrounding the proposed project, but not in any areas that would be affected by the proposed action. Surveys conducted by the BLM in 1982 indicate that the species is more abundant than previously thought and probably is present in the area of proposed facilities. The species will likely be recommended for delisting based on the new information.

The distribution of major vegetation types on the plant site and along proposed linear facilities is summarized in Table 2-6. More detailed information on the distribution of individual stands of major vegetation types on the plant site and along proposed linear facilities is presented in the Wildlife Technical Report (wildlife habitat types).

Alternatives

The major vegetation types discussed for the proposed action are also present in areas potentially affected by alternative project components. The distribution of these types is summarized in Table 2-6. No federal listed or proposed threatened or endangered species are known to occur in the geographic areas of influence for alternative project components, although Physaria condensata is likely to occur as discussed above for proposed project facilities.

WILDLIFE

Geographic Area of Influence

The occurrence, distribution, and abundance of wildlife species (mammals, birds, reptiles, and amphibians) were primarily evaluated in the area of influence described for vegetative resources. A larger area was evaluated for potential indirect impacts, including road-kill mortality of certain species on primary access roads in the project site region, and legal and illegal hunting. Potential increased levels of legal and illegal hunting were evaluated in the 1980 hunt area in which the proposed facilities would be located.

Proposed Action

The area encompassed by the proposed action consists of six major wildlife habitat types: sagebrush shrubland, sagebrush-serviceberry shrubland, aspen forest, perennial mat forb-grass, juniper woodland-sagebrush shrubland, and wet meadow. These habitat types are typical of the region, which is transitional between lower-elevation areas typical of the Great Basin and higher-elevation montane areas. Two additional habitat types which cover smaller areas are cliff rock outcrop and stream-pond. The distribution of habitat types is determined by a large number of environmental factors, including topography, aspect, slope, elevation, light, moisture, soil characteristics, land use history, and additional factors. Each major habitat type supports a distinct community of mammal, bird, reptile, and amphibian species. Each community is comprised of a distinct number of species occurring in different numbers.

The fauna of the geographic area of influence for the proposed action includes approximately 35 regularly occurring mammal species (Long 1965; Findholt et al. 1981), 195 bird species (Oakleaf et al. 1982), 7 reptile species, and 3 amphibian species (Baxter and Stone 1980). Most of the species are terrestrial, associated with one or more

Table 2-6. DISTRIBUTION OF MAJOR VEGETATION TYPES AT THE PROPOSED
PLANT SITE AND WITHIN ROW'S FOR PROPOSED AND ALTERNATIVE
LINEAR PROJECT COMPONENTS

Facility	Vegetation (Habitat) Type	Distribution of Vegetation in Areas That Would be Occupied by Project Components ^a
<u>Proposed Action</u>		
Plant Site	Sagebrush Shrubland	40
Gas Gathering System	Sagebrush Shrubland	8
	Aspen Forest	0.6
	Sagebrush-Serviceberry Shrubland	2.2
	Perennial Mat Forb-Grass	0.3
Sales Gas Pipeline	Sagebrush Shrubland	6.2
	Perennial Mat Forb-Grass	1.4
	Aspen Forest	0.2
NGL and Condensate Pipelines	Sagebrush Shrubland	13.6
	Sagebrush-Serviceberry Shrubland	3.9
	Perennial Mat Forb-Grass	2
	Aspen Forest	1.3
Processing and Disposal of H ₂ S		
Sulfur Haul Road	Perennial Mat Forb-Grass	10.8
	Sagebrush Shrubland	9.9
	Sagebrush-Serviceberry Shrubland	1.6
	Wet Meadow	0.2
Electric Power Transmission Line ^b	Perennial Mat Forb-Grass	0.1
	Aspen Forest	0.1
Access Road		
Temporary: Spring Creek	Sagebrush Shrubland	16.7
	Perennial Mat Forb-Grass	1.4
	Juniper Woodland-Sagebrush Shrubland	0.7
	Sagebrush-Serviceberry Shrubland	0.2
Permanent: Eastern ^c Access Road		

Table 2-6. DISTRIBUTION OF MAJOR VEGETATION TYPES AT THE PROPOSED PLANT SITE AND WITHIN ROW'S FOR PROPOSED AND ALTERNATIVE LINEAR PROJECT COMPONENTS (concluded)

Facility	Vegetation (Habitat) Type	Distribution of Vegetation in Areas That Would be Occupied by Project Components ^a
<u>Alternatives</u>		
Gas Gathering System	Sagebrush Shrubland	5.9
	Perennial Mat Forb-Grass	2.5
	Aspen Forest	0.9
	Sagebrush-Serviceberry Shrubland	0.1
Sales Gas Pipeline Alternative 1	Sagebrush Shrubland	11
	Sagebrush-Serviceberry Shrubland	3.8
	Perennial Mat Forb-Grass	2
	Aspen Forest	0.7
	Sagebrush Shrubland	7.6
	Perennial Mat Forb-Grass	7.5
	Sagebrush-Serviceberry Shrubland	2.4
Alternative 2	Sagebrush Shrubland	7.6
	Perennial Mat Forb-Grass	7.5
	Sagebrush-Serviceberry Shrubland	2.4
NGL and Condensate Pipelines Alternative 1	Sagebrush Shrubland	20.5
	Sagebrush-Serviceberry Shrubland	8.6
	Perennial Mat Forb-Grass	2
	Aspen Forest	2
	Juniper Woodland-Sagebrush Shrubland	0.6
	Wet Meadow	0.1
Electric Power Transmission Line	Sagebrush Shrubland	5.8
	Perennial Mat Forb-Grass	1.4
	Aspen Forest	0.2
Sulfur Haul/Access Road	(Same as for alternative transmission line)	
Water Supply Alternative 1	(Same as for proposed sales gas pipeline)	

^aArea of vegetation expressed as acres for the proposed plant site and miles of ROW for linear project components.

^bMilepost 0.0-1.8 covered under proposed action, gas gathering system.

^cIncluded under proposed sulfur haul road.

vegetation habitat types typical of the region. A relatively low number of species that occur in the region are aquatic or semiaquatic, associated with lake, pond, river, stream, marsh, swamp, and similar habitats. More detailed information on the occurrence, distribution, and abundance of animal species in relation to major habitat types is presented in the Wildlife Technical Report.

The wildlife impact assessment emphasized important species, defined as: 1) federally listed or proposed federal threatened or endangered species; 2) recreationally and economically important game species; and 3) raptors, which are of high federal and state resource management agency concern because of declining populations and sensitivity to disturbance.

Endangered or Threatened Species. Four listed endangered species are confirmed to or potentially occur in the project site area: black-footed ferret, bald eagle, American peregrine falcon, and whooping crane. There are no recent confirmed records of the black-footed ferret in areas that would be potentially affected by the proposed action (Clark 1978, 1980; Clark and Campbell 1981). The results of a field survey conducted for this EA indicated that no white-tailed prairie dog concentration areas (black-footed ferret habitat) would be affected by clearing activities for the proposed action. The bald eagle, American peregrine falcon, and whooping crane occur in the project region only as rare to locally common migrants, winter visitors, or nonbreeding summer visitors (Dreweine 1981; Jenkins 1980, 1981; Oakleaf 1978, 1979; Oakleaf and Long 1980; Oakleaf et al. 1982). No habitats that support concentrations of individuals of these species are known to be located in areas that would be potentially affected by the proposed action, including a major bald eagle winter and spring migration roosting and concentration area located in

Woodruff Lower Narrows, approximately 13 miles southwest of the plant site.

Recreationally and Economically Important Game Species. Important big-game species that occur in the project site area are mule deer, pronghorn, elk, and moose. The sage grouse also occurs in the area.

Raptors. Raptor species that are confirmed as breeders (nesters) in the project area include the golden eagle, prairie falcon, red-tailed hawk, and goshawk.

Distribution of Important Wildlife Habitats in Relation to the Location of the Proposed Action Project Components. The location of important mammal and bird habitats in relation to proposed project facilities is presented in Table 2-7 and on Figure 2-1. Habitats that are included are: 1) areas of crucial mule deer winter range; 2) sage grouse strutting grounds and nesting concentration areas; and 3) recently active golden eagle, prairie falcon, redtailed hawk, and goshawk nests.

Alternatives

The general description of wildlife species and habitat presented above for the proposed action is also applicable to alternative project components. The locations of important mammal and bird habitats in relation to alternative project components are presented in Table 2-7 and on Figure 2-1.

AQUATIC ECOLOGY

Geographic Area of Influence

Downstream sections of all streams that would be crossed or otherwise potentially affected by facilities in the proposed action or alternatives were considered in the analysis. In addition, streams and rivers that receive water from potentially directly affected streams were considered.

Table 2-7. LOCATION OF IMPORTANT WILDLIFE HABITATS IN RELATION TO PROPOSED AND ALTERNATIVE PROJECT FACILITIES^a

Facility	Species	Important Habitat	Milepost	Distance from Project Facilities (mi) ^b	Direction
<u>Proposed Action</u>					
NGL and Condensate Pipelines	Red-tailed Hawk	Nest	10.3	0.1	W
			14.3	0.2	W
			14.4	0.3	E
			15.8	0.4	W
			16.2	0.6	E
			18.6	0.4	S
			20.8	1.1	N
			20.8	1.6	E
Processing and Disposal of H ₂ S	Prairie Falcon	Nest	2.0	1.4	N
	Sage Grouse	Strutting Ground, Nesting Concentration Areas	8.5	0.2	S
			14.3	1.7	S
	Golden Eagle	Nest	16.0	1.9	N
	Sage Grouse	Strutting Ground, Nesting Concentration Area	18.5	1.2	N
	Red-tailed Hawk	Nest	19.3	0.3	N
			19.8	0.6	S
	Prairie Falcon	Nest	19.9	1.4	S
	Sage Grouse	Strutting Ground, Nesting Concentration Areas	20.3	0.8	S
			20.9	0.2	S
			21.7	1.8	N

Table 2-7. LOCATION OF IMPORTANT WILDLIFE HABITATS IN RELATION TO PROPOSED AND ALTERNATIVE PROJECT FACILITIES^a (continued)

Facility	Species	Important Habitat	Milepost	Distance from Project Facilities (mi) ^b	Direction
Access Roads					
Spring Creek Road	Mule Deer	Crucial Winter	6.7 - 19	12.3	-
	Golden Eagle	Nest	7.4	0.6	S
	Sage Grouse	Strutting Ground, Nesting Concentration Areas	8.3	0.7	S
			10.0	0.2	W
	Golden Eagle	Nest	12.0	1.7	E
Eastern Access Road	Sage Grouse	Strutting Ground, Nesting Concentration Areas	13.4	0.1	W
			15.5	2.0	E
	(Same as proposed sulfur haul road)	16.0	0.9	W	
		16.6	0.4	E	
		17.1	0.5	W	
Sales Gas Pipeline Alternative 1	Prairie Falcon	Nest	2.0	1.4	N
			17.0 - 17.5	0.5	-
	Alternative 2	Crucial Winter	17.1	2.0	E
			17.9	0.3	W
			(Same as proposed NGL and Condensate Pipelines to milepost 17.1)		
Alternatives					

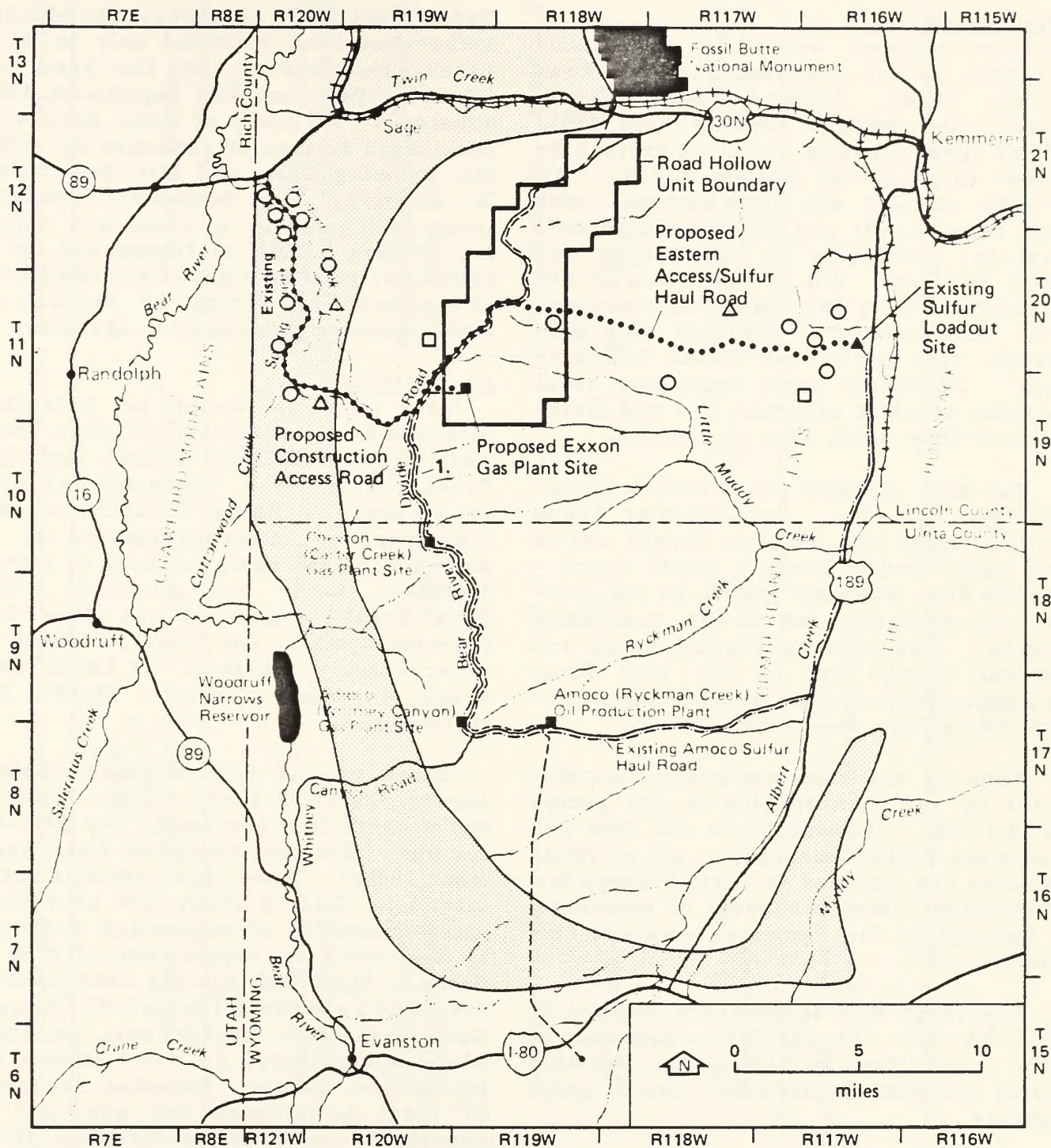
Table 2-7. LOCATION OF IMPORTANT WILDLIFE HABITATS IN RELATION TO PROPOSED AND ALTERNATIVE PROJECT FACILITIES^a (concluded)

Facility	Species	Important Habitat	Distance from Project Facilities (mi) ^b			Direction
			Milepost			
NGL and Condensate Pipelines						
Alternative 1 ^c	Red-tailed Hawk	Nest	25.0	1.7		W
	Goshawk	Nest	25.7	0.2		W
			26.3	0.1		W
			26.4	1.8		E
	Mule Deer	Crucial Winter	29.0 - 31.8	2.8		-

^aIncludes only facilities located in the area of important wildlife habitats.

^bDistance to the center of a sage grouse strutting ground or to a raptor nest; for mule deer, the miles of crucial winter range traversed.

^cFor milepost 0.0 to 19.5, refer to the proposed NGL and condensate pipelines.



LEGEND

- | | |
|--------------------------------|------------------------------|
| Mule Deer Crucial Winter Range | Prairie Falcon Nest |
| Golden Eagle Nest | Sage Grouse Strutting Ground |

Note: Refer to Map 1-2 for Key to proposed and alternative project components.

Figure 2-1. IMPORTANT WILDLIFE AREAS

Proposed Action

Four streams would be potentially affected by the proposed action: Road Hollow Creek, Chicken Creek, Spring Creek, and Bridger Creek (Table 2-8). All of these streams would be crossed by linear facilities of various types. All of the streams are intermittent, with flow in snowmelt and precipitation runoff periods, primarily in the spring and early summer. All of the streams are characterized by low flow, narrow channels, silt substrate, frequent high turbidity, and fairly high water temperature. Additional upper headwater areas of other streams with very low and intermittent flow would also be crossed.

The four streams are included in two drainage systems. Two streams (Road Hollow Creek and Chicken Creek) are in the Little Muddy Creek - Muddy Creek - Black's Fork drainage system on the eastern and southern side of the Bear River Divide. Two streams (Spring Creek and Bridger Creek) are in the Bear River drainage system on the western and northern side of the Bear River Divide.

None of the streams support populations of any fish species in any period of the year (Wyoming Game and Fish Department 1981a, undated). All of these streams are included in Class 5 (very low production, often incapable of sustaining a fishery) by the Wyoming Game and Fish Department.

Important fish species are defined in this EA as: 1) species considered as rare or sensitive by BLM or the Wyoming Game and Fish Department, and 2) game species.

No federal listed or proposed threatened or endangered fish species occur in the project site area. The Bonneville cutthroat trout occurs only in the Bear River (Wyoming Game and Fish Department 1981a,b, undated). The Colorado River cutthroat trout has not been recorded in any streams or rivers in the geographic areas of influence (Wyoming Game and Fish

Department 1977, undated). The bluehead sucker has been recorded only in Muddy Creek, Black's Fork, and the Bear River (Wyoming Game and Fish Department 1981a, undated). All three of these species are considered as rare or sensitive by BLM or the Wyoming Game and Fish Department. In addition, the Bonneville cutthroat trout is currently a candidate species for federal listing as threatened or endangered, pending planned development of alternatives to listing by federal and state resource management agencies.

Alternatives

Four streams would be potentially affected by alternatives: Chicken Creek, Twin Creek, Shurtleff Creek, and Clear Creek (Table 2-8). These streams would be crossed by linear facilities of various types. Characteristics of the streams are the same as those of streams described under the proposed action. Twin Creek is part of the Bear River drainage system, and Shurtleff Creek and Clear Creek are part of the Little Muddy Creek - Muddy Creek - Black's Fork system.

Three of the four streams (Chicken Creek, Shurtleff Creek, Clear Creek) do not support fish species in any period of the year (Wyoming Game and Fish Department 1981a). These three streams are included in Class 5 (very low production, often incapable of supporting a fishery) by the Wyoming Department of Fish and Game. Eight fish species have been recorded in Twin Creek (Table 2-9) (Wyoming Game and Fish Department, undated), which is considered a Class 4 stream (low production waters, fisheries frequently of local importance but generally incapable of sustaining substantial fishing pressure). No game fish species (trout and similar species) have been recorded in Twin Creek in the project site area.

LIVESTOCK AND RANGE

Geographic Area of Influence

Direct impacts to livestock grazing and the range resource (e.g., loss of

Table 2-8. CHARACTERISTICS OF STREAM AND RIVER HABITATS POTENTIALLY AFFECTED BY THE PROPOSED ACTION AND ALTERNATIVES

Facility	Stream	Stream ^a Fishery		Milepost	Flow Type ^b	Drainage System
		Classification				
<u>Proposed Action ^c</u>						
Gas Gathering System	Road Hollow Creek	5		Various	I	Muddy Creek (5) ^a - Black's Fork (4)
	Chicken Creek	5		Various	I	Muddy Creek (5) - Black's Fork (4)
Access Roads - Spring Creek Road	Spring Creek	5		5.4	I	Bridger Creek (5) - Bear River (3)
	Bridger Creek	5		18.8	I	Bear River (3)
<u>Alternatives ^c</u>						
Gas Gathering System	Chicken Creek	5		0.8	I	Muddy Creek (5) - Black's Fork (4)
Sales Gas Pipeline - Alternative 2	Twin Creek	4		17.5	I	Bear River (3)
NGL and Condensate Pipelines - Alternative 1	Shurtleff Creek	5		21.9	I	Muddy Creek (5) - Black's Fork (4)
	Clear Creek	5		24.3	I	Muddy Creek (5) - Black's Fork (4)

^aStream fishery classifications: Class 4 -- Low production.

Class 5 -- Very low production.

^bI -- Intermittent.

^cOnly those proposed and alternative project components (requiring construction activity) that cross classified streams are listed.

Table 2-9. OCCURRENCE OF FISH SPECIES IN STREAM AND RIVER HABITATS POTENTIALLY AFFECTED BY THE PROPOSED ACTION OR ALTERNATIVES

Species	Occurrence/Stream-River									
	Road Hollow Creek	Chicken Creek	Spring Creek	Bridger Creek	Twin Creek	Shurtleff Creek	Clear Creek	Muddy Creek	Black's Fork	Bear River
Brown Trout								X	X	X
Bonneville Cutthroat Trout										X
Rainbow Trout								X	X	
Whitefish								X	X	X
Largemouth Bass								X	X	
Redside Shiner								X	X	
Fathead Minnow					X			X	X	X
Mottled Sculpin					X			X	X	
Longnose Dace					X			X	X	X
Speckled Dace					X			X	X	X
Roundtail Chub					X			X	X	
Leatherside Chub					X			X	X	
Utah Chub					X			X	X	
Utah Sucker					X			X	X	X
Bluehead Sucker								X	X	X
Flannelmouth Sucker								X	X	
Mountain Sucker					X			X	X	X
Carp								X	X	X
Total Number of Species Recorded	0	0	0	0	8	0	0	16	15	12

forage production and animal unit months [AUMs]) would occur on all areas that would be taken out of production or temporarily disturbed by the proposed action or alternatives.

The proposed action and alternatives have the potential to disrupt ranching (e.g., seasonal livestock movements) and lambing operations within the Cumberland/Uinta grazing allotment. Increased road traffic along access and haul roads (unless fenced) would contribute to livestock losses within the Cumberland/Uinta allotment.

Proposed Action

All of the project components associated with the proposed action are within the Cumberland/Uinta grazing allotment. This grazing allotment contains 459,302 acres, and the carrying capacity averages 6.9 acres per AUM. Currently, approximately 8500 cattle and 36,000 sheep use the allotment area.

Typically, cattle enter the area (from the west) in the spring and are removed in the fall. Cattle grazing is allowed between May 1 and October 15. Sheep enter the area in the spring for lambing, with the majority moving north for the summer. Most then return in the fall, prior to moving west to the winter range. The lambing areas (see the Kemmerer Resource Area Oil and Gas Leasing Environmental Assessment Record [BLM 1979]) have historically provided the necessary combination of forage and cover and an environment relatively free from harassment. The proposed construction access along Spring Creek Road (MP 5.5-19.0), and the proposed eastern access/sulfur haul road (MP 15.0-22.5) would traverse lambing areas (BLM 1980).

The AUM data presented in Table 2-10 for the proposed action were calculated using the 1964 BLM Range Survey. AUM data were calculated only for areas of potential new disturbance or forage production loss (i.e., project component

overlap with recently disturbed areas or areas that are already out of production were not included).

Alternatives

The majority of the alternative project components are within the Cumberland/Uinta grazing allotment (see the proposed action discussion above). The portion of the alternative sulfur haul/access road route that follows Dee Ranch Road to Highway 189 (about 4 miles) is within the Albert Creek grazing allotment. The last 10 to 11 miles of the alternative condensate-NGL pipelines to Divide Junction traverse the following grazing allotments: Rock House (MP 23.6-23.9); Byrne Creek (MP 26.9-27.9); Heinsaw Creek (MP 27.9-32.1); and Myers (MP 32.1-33.8).

The alternative sulfur haul road that follows Spring Creek Road (MP 5.5-19.0), the alternative sales gas pipeline to Northwest compressor station (MP 7.5-17.5), and the last 9 miles of the alternative sulfur haul/access road to Highway 189 traverse lambing areas (BLM 1980).

AUM data for the alternative project components are presented in Table 2-11.

CULTURAL RESOURCES

Geographic Area of Influence

The geographic area of influence for direct impacts to cultural resources (which include prehistoric and historic archeological and architectural sites, and sites and areas of importance to traditional cultural lifeways) is defined as the entire Road Hollow Lease Unit (refer to Map G-1) and a 1-mile-wide corridor centering on linear project elements outside of the lease unit (i.e., pipelines, alternative transmission line, and access/haul roads). A 1-mile-wide corridor was defined because it is assumed that a half-mile distance on either side of any project element would be a realistic area to include any impacts that could occur as a result of construction and maintenance activities.

Table 2-10. AUM DATA SUMMARY FOR THE PROPOSED ACTION

Variation in Carrying Capacity for Cattle (acres per AUM)	Variation in Carrying Capacity for Sheep (acres per AUM)	Estimated Construction Acreage ^a	Estimated Total AUMs Available (cattle/sheep)
<u>Plant Site</u>			
5.4 ^b	4.9 ^b	40	7.4/8.2
<u>Gas Gathering Pipelines for Wells 4, 7, 8, 9, 10, 11, 12, and 13</u>			
5.4-7.9	4.9-6.6	55	8.0/9.5
<u>Sales Gas Pipeline to Carter Creek</u>			
4.2-6.6	3.9-6.3	19	3.2/3.6
<u>NGL and Condensate Pipelines to Ryckman Creek</u>			
4.2-8.9	3.9-7.9	100	17.7/17.8
<u>Transmission Line</u>			
7.0-7.4	6.1-6.3	<1	0.1/0.1
<u>Eastern Access and Sulfur Haul Road</u>			
3.8-12.1	4.9-11.2	501	64.6/72.0
	Totals	716	101.0/111.2

^aEstimated construction acreage includes only potential new disturbance/forage production loss areas (i.e., project component overlap with recently disturbed areas or areas that are already out of production were not included).

^bAccording to BLM range survey; no variation.

Table 2-11. AUM DATA SUMMARY FOR THE ALTERNATIVE PROJECT COMPONENTS

Variation in Carrying Capacity for Cattle (acres per AUM)	Variation in Carrying Capacity for Sheep (acres per AUM)	Estimated Construction Acreage ^a	Estimated Total AUMs Available (cattle/sheep)
<u>Alternative Gas Gathering Pipelines for Wells 7, 8, 9, and 10</u>			
4.9-7.9	4.9-6.6	45	6.6/7.6
<u>Alternative Sales Gas Pipeline to Whitney Canyon</u>			
4.2-6.6	3.9-6.6	44	7.8/7.8
<u>Alternative Sales Gas Pipeline to Northwest-Kemmerer Compressor Station</u>			
3.4-14.2	3.2-14.7	42	6.2/7.0
<u>Alternative Condensate-NGL Pipelines to Divide Junction (second module)</u>			
Cumberland/Uinta Allotment			
4.2-8.9	3.9-7.9	114	19.5/19.9
Rock House Allotment			
6.9 ^b	6.9 ^c	16	2.3/2.3
Byrne Creek Allotment			
9.0 ^b	9.0 ^c	5	0.5/0.5
Heinsaw Creek Allotment			
8.1 ^b	8.1 ^c	20	2.5/2.5
Myers Allotment			
9.0 ^b	9.0 ^c	9	0.9/0.9
<u>Alternative Water Pipeline from Carter Creek</u>			
4.2-6.6	3.9-6.3	19	3.2/3.6
<u>Alternative Transmission Line from Carter Creek</u>			
4.6-6.6	4.3-6.3	18	3.1/3.4
<u>Alternative Access/Sulfur Haul Road</u>			
4.6-6.6	4.3-6.3	63	10.9/11.9

^aEstimated construction acreage includes only potential new disturbance/forage production loss areas (i.e., project component overlap with recently disturbed areas or areas that are already out of production were not included).

^bMore detailed data not available.

^cAUM data not available for sheep in these areas; assumed same as for cattle.

The geographic area of influence for indirect impacts to cultural resources is the area encompassed by a 100-mile radius centering on potentially affected communities, such as Kemmerer and Evanston. It is assumed that this is a realistic area that may be subject to impacts due to increased recreational use as a result of the proposed Road Hollow project.

It is this larger area that includes the Bear River Divide that was used as a regional base for comparison against which to evaluate the potential impacts to, and occurrence and significance of, specific prehistoric, ethnohistoric, and historic resources. In order to develop this background framework for analysis, relevant information was obtained from appropriate regional literature.

Cultural resource surveys have been numerous within the geographic area of influence for direct impacts (2 BLM Class II surveys, 128 corridor surveys, 41 project-specific intensive surveys, and 3 reconnaissance surveys: 172 total surveys) but have intensively covered only approximately 13 percent of that area. The proposed plant site and alternative 2 for the sales gas pipeline appear to have been completely surveyed by cultural resource specialists, and the eastern access road has been entirely surveyed except for a half-mile segment in Sections 26 and 35, T20N, R117W. The remaining project elements have received partial or no cultural resource survey.

Proposed Action

Prehistory. The Bear River Divide area has received relatively little comprehensive study by prehistorians. However, the available evidence indicates that there is a significant record of at least 11,000 years of human occupation in the area, and that sites representative of any segment of this long record could be found within the geographic area of influence (Metcalf, Zier, and Peebles 1982; Sharrock 1966; Frison 1978). Prehistoric cultural resources in the Bear River

Divide area may represent human adaptations to and movements through the archeological "border zone" between the traditionally defined Plains and Great Basin. Table 2-12 summarizes the cultural chronology applied to the Bear River Divide area.

Cultural resource site records and survey reports from the Wyoming Recreation Commission (Laramie and Cheyenne), from the BLM (Rock Springs and Kemmerer)- and from regional research facilities were examined in order to identify the known prehistoric cultural resources within the geographic area of influence for direct impacts. A total of 26 prehistoric cultural resources were identified within that area (which has been subject to 13 percent survey coverage). Of those, 1 is within the proposed sales gas pipeline ROW and 6 are within the eastern access road ROW. Of the latter, 1 site (48 LN 1170) has been recommended as eligible for inclusion in the National Register of Historic Places. Table 2-13 provides summary descriptions of the identified cultural resources. Some resources are associated with more than one project element; therefore the total number of cultural resources presented for each element is different from the 114 resources associated with the entire geographic area of influence for direct impacts. Also, some cultural resources located within the Road Hollow Lease Unit are not directly associated with any presently proposed project element.

Ethnohistory. The indigenous people who considered this area their home territory were Shoshonean speakers. They are most frequently referred to as Eastern Shoshoni, and their descendants today are associated with the Wind River Indian Reservation in Wyoming (Murphy and Murphy 1960). Although no specific locational information on Shoshoni villages or camps exists for the geographic area of influence, sites of the ethnohistoric period would probably be indistinguishable from those of the Late Archaic. None has been

Table 2-12. CULTURAL CHRONOLOGY OF THE PROPOSED ROAD HOLLOW PROJECT AREA

Period/ Subphase	Date	Projectile Point Style or Cultural Group	Characteristics (Sites)	Probability of Site Occurrence in Project Area
Historic	300 BP to Present	Shoshonean, Cheyenne, Gros Ventre, Comanche, Flathead, Crow, Arapahoe, Souix.	Hunting and gathering, some buffalo and antelope hunting by communal drives, mostly marginal subsistence	High
		Euroamerican, Asian American.	Oregon Trail, shepherd groups, etc.	High
Late Prehistoric	1700 - 300 BP	Shoshonean, Intermountain, Plains or Desert Side-Notched.	Marginal subsistence, hunting and gather- ing, pottery in some sites (Eden-Farson, Wardell)	High
Late Archaic	3000 - 1700 BP	Avonlea, Besant, Elko, Rose Springs, Eastgate.	Hunting and gathering (Pine Springs, Meadow Draw)	Moderate
Archaic	4500 - 3000 BP	Scoggin, Duncan, Hanna, McKean, Humboldt, Pinto, Elko.	Hunting and gathering (Pine Springs)	Moderate
Early Archaic	7500 - 5000 BP	McKean (?), Northern Side-Notched, Hawken.	Generally a more arid period with marginal occupations suspected in higher areas	Small
Late Paleoindian	10,000 - 7500 BP	Lusk, Fredrick, Cody, Alberta, Hell Gap, Agate Basin, Midland. Scots Bluff, Eden.	Hunting extinct fauna (<u>Bison antiquus</u>), bison traps and some communal hunting suspected, col- lecting flora probable (Eden Site)	Very small
Paleoindian	11,000 - 10,500 BP	Folsom.	Hunting extinct fauna (<u>Bison antiquus</u>), bison traps and some communal hunting suspected, col- lecting flora probable	Very small
	11,500 - 11,000 BP	Clovis.	Hunting extinct fauna, mammoth traps and com- munal procedures sus- pected, collecting Flora probable	Very small

Table 2-13. SUMMARY DATA OF PREHISTORIC CULTURAL RESOURCES IDENTIFIED WITHIN THE GEOGRAPHIC AREA OF INFLUENCE

Project Element	Site Type	Number of Sites Within the Geographic Area of Influence	Number of Sites Within the Construction Right-of-Way	Number of Sites Recommended as Eligible for National Register ^a
<u>Proposed Action</u>				
Plant Site	None			
Gas Gathering Lines	None			
Sales Gas Pipeline	Camp	1	0	?
	LS	1	0	0
Processing and Disposal of H ₂ S	(Sites listed under Eastern Access Road)			
Condensate and NGL	LS	3	0	0
Pipelines	LS,FP/FCR	1	0	0
	Camp	1	0	0
Access Roads:				
Eastern Access Road	Camp	2	0	1
	LS	2	1	0
	LS,FP/FCR	4	1	0
	LS,Source,FP,FCR	1	1	1
	LS,Dump ^b	1	0	0
	FP/FCR	1	0	0
	Source	4	0	0
	Sheep,LS,FP/FCR ^b	1	0	0
	Other	1	0	0
	LS/F,Source,Dump	1	0	0
	LS,Sheep ^b	1	0	0
	LS,FP/FCR, Historic and Modern Rock Art ^b	1	0	0
Spring Creek Road	LS, FP/FCR	3	0	0
Electric Power Supply	None			
<u>Alternatives</u>				
Gas Gathering Lines	None			
Sales Gas Pipelines				
Alternative 1	Camp	1	0	0
	LS	2	0	0
Alternative 2	Camp	1	0	0
	LS	1	0	0
	LS,FP/FCR	4	2	0
	LS, Source	2	0	1
	FP/FCR	2	0	0

Table 2-13. SUMMARY DATA OF PREHISTORIC CULTURAL RESOURCES IDENTIFIED WITHIN THE GEOGRAPHIC AREA OF INFLUENCE (concluded)

Project Element	Site Type	Number of Sites Within the Geographic Area of Influence	Number of Sites Within the Construction Right-of-Way	Number of Sites Recommended as Eligible for National Register ^a
<u>Alternatives (continued)</u>				
Condensate and NGL Pipelines				
Alternative 1	Camp	1	0	0
	LS	3	0	0
	LS,FP/FCR	1	0	0
	FP/FCR	1	0	0
	Source	1	0	0
Processing and Disposal of H ₂ S				
Alternative 1 ²	(Sites listed under Alternative 2 below)			
Alternative 2 ^c	Camp	1	0	?
	LS	1	0	0
Alternative 3	(Sites listed under Proposed Action, Eastern Access Road and Spring Creek Road; also under Alternative 2, Processing and Disposal of H ₂ S)			
Alternative 4	(Sites listed under Proposed Action, Plant Site)			
Alternative 5	(Sites listed under Alternative 2, Processing and Disposal of H ₂ S)			
Water Supply	(Sites listed under Proposed Action, Sales Gas Pipeline)			
Electric Power Supply	(Sites listed under Alternative 2, Processing and Disposal of H ₂ S)			
Access Roads	(Sites listed under Alternative 2, Processing and Disposal of H ₂ S)			

^aThis information is available only for the small percentage of resources which have been evaluated for NRHP eligibility.

^bPrehistoric and historic components present.

^cData only listed for portion of road which would require upgrading (MP 0.0-7.4).

Abbreviations:

LS = lithic scatters

Camp = prehistoric camp or habitation sites

Source = lithic raw material source areas

FP/FCR = fire pits or areas of fire-cracked rock

F = sites with features of unknown identity

Sheep = shepherd camps

Dump = historic trash dumps

identified within the geographic area of influence for direct impacts. No sites of traditional Native American religious significance have been identified in the literature as being located within this same area.

History. Historic use of the area as a transportation route, particularly by travelers along the Oregon and California trails, has left trail remnants and associated campsites that may have significance. The Oregon Trail is a designated National Historic Trail (P.L. 95-625), the purpose of such designation being "the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment" (92 Stat. 3511).

Several variants of the Oregon Trail are located in the project vicinity. The earliest segment, known as the Bridger Route of the Oregon Trail, left Ft. Bridger to the southeast, and ascended the Bear River Divide. The Bear River Divide segment of the Oregon Trail passes directly through the geographic area of influence for direct impacts. Other, later routes (the Greenwood-Sublette Cutoff, the Lander Cutoff, the Mormon Trail, the Slate Creek Trail, etc.) passed north and south of the Bear River Divide Area, and were established to eliminate the southern swing to Ft. Bridger and the Bear River Divide ascent, saving the travelers several days journey. The Bridger Route/Bear River Divide Segment of the Oregon Trail System was used exclusively from the earliest passages of Marcus Whitman and Samuel Parker in 1935 until 1944, when Caleb Greenwood established the Greenwood-Sublette Cutoff. Discovery of gold in California in 1849 led to the growing popularity of the shorter cutoffs for immigrant travel, and the Bear River Divide Segment declined in use. The Bear River Divide segment, along with numerous cutoffs and deviations, has been recommended as a component of the Oregon National Historic Trail (National Park Service, 1981).

The Oregon Trail period ushered in the era of Euroamerican settlement in the Bear River Divide area. By the 1870s and 1880s cattle ranching was a major economic activity on the eastern side of the divide. Cattle were replaced by sheep in the 1890s, and ranchers used the range east and south of Kemmerer throughout the twentieth century. Sheepherder camps are the most numerous (approximately 70 percent) of the known historic sites within the geographic area of influence for direct impacts. Coal mining, oil and gas development, and ranching comprise the region's major activities today.

The same method used to identify prehistoric cultural resources was used to identify historic cultural resources within the geographic area of influence for direct impacts. Notable among the identified historic resources are the many variants of the Oregon Trail that traverse the area. These trail remnants today vary greatly in their degree of preservation, hence also in their individual management needs. One of these, as mentioned earlier, is the Bear River Divide segment. The proposed eastern access road would cross this particular segment of the Oregon Trail. Another segment of the Trail passes directly through the proposed plant site, while other segments either cross or closely parallel the proposed gas gathering lines for wells 9 and 12, the sales gas pipeline, Spring Creek Road, and the electric power transmission line. Table 2-14 provides summary descriptions of the identified or suspected Oregon Trail segments. Eleven other historic cultural resources were identified within the geographic area of influence for direct impacts defined for the proposed action. Table 2-14 provides summary descriptions of those resources.

Alternatives

A total of 60 prehistoric cultural resources have been identified as potentially being affected by the alternative

Table 2-14. SUMMARY DATA OF HISTORIC CULTURAL RESOURCES IDENTIFIED WITHIN THE GEOGRAPHIC AREA OF INFLUENCE

Project Element	Site Type	Number of Sites Within the Geographic Area of Influence	Number of Sites Within the Construction Right-of-Way	Number of Sites Recommended as Eligible for National Register ^a
<u>Proposed Action</u>				
Plant Site	Oregon Trail	1	1 ^b	?
Gas Gathering Lines:				
for Wells 4 & 7	Oregon Trail	1	0	?
for Well 8	Oregon Trail	1	0 ^b	?
for Well 9	Oregon Trail	1 ^c	2 ^b	?
for Well 10	Oregon Trail	1	0 ^b	?
for Well 12	Oregon Trail	1 ^c	1 ^b	?
for Well 13	Oregon Trail	1	0 ^b	?
Sales Gas Pipeline	Oregon Trail	1	1 ^b	?
	Sheep	1	0	0
	Cabin & Corral	1	0	0
	Dump	1	0	0
Processing and Disposal of H ₂ S	(Sites listed under Proposed Action, Eastern Access Road)			
Condensate and NGL Pipelines	Sheep	3	0	0
	Dump	2	0	0
	Cabin & Corral	1	0	0
Access Roads:				
Eastern Access Road	Oregon Trail	1 ^c	2 ^b	1
	Sheep	3	1	0
Spring Creek Road	Sheep	1	0 ^b	0
	Oregon Trail	1	1 ^b	?
Electric Power Supply Transmission Line	Oregon Trail	1 ^c	2 ^b	?
	Dump	2	0	0
<u>Alternative</u>				
Gas Gathering Lines				
for Well 7	Oregon Trail	1	1 ^b	?
for Well 8	Oregon Trail	1	1 ^b	?
for Well 9	Oregon Trail	1 ^c	1 ^b	?
for Well 10	Oregon Trail	1	0	?
Sales Gas Pipelines				
Alternative 1	Oregon Trail	1	1 ^b	?
	Cabin & Corral	1	0	0
	Dump	1	0	0
	Sheep	2	0	0
Alternative 2	Dump	1	0	0
	Sheep	5 ^c	4 ^b	0
	Oregon Trail	1 ^c	2	1

Table 2-14. SUMMARY DATA OF HISTORIC CULTURAL RESOURCES IDENTIFIED WITHIN THE GEOGRAPHIC AREA OF INFLUENCE (concluded)

Project Element	Site Type	Number of Sites Within the Geographic Area of Influence	Number of Sites Within the Construction Right-of-Way	Number of Sites Recommended as Eligible for National Register ^a
Condensate and NGL Pipelines				
Alternative 1	Sheep	1	0	0
	Dump	1	0	0
	Cabin & Corral	1	0	0
Processing and Disposal of H ₂ S				
Alternative 1 ^d	(Sites listed under Alternative 2 below)			
Alternative 2	Oregon Trail	1	1 ^b	?
	Cabin & Corral	1	0	0
	Sheep	1	0	0
	Dump	1	1	0
Alternative 3	(Sites listed under Proposed Action, Eastern Access Road and Spring Creek Road; also under Alternative 2, Processing and Disposal of H ₂ S)			
Alternative 4	(Sites listed under Proposed Action, Plant Site)			
Alternative 5	(Sites listed under Alternative 2, Processing and Disposal of H ₂ S)			
Water Supply	(Sites listed under Proposed Action, Sales Gas Pipeline)			
Electric Power Supply	(Sites listed under Alternative 2, Processing and Disposal of H ₂ S)			
Access Roads	(Sites listed under Alternative 2, Processing and Disposal of H ₂ S)			

^aThis information is available only for the small percentage of resources which have been evaluated for NRHP eligibility.

^bThis number refers to number of times project element crosses the Oregon Trail.

^cThese sections of the Oregon Trail contain preserved wagon ruts.

^dData only listed for portion of road which would require upgrading (MP 0.0-7.4)

Terms:

Sheep = shepherd camps

Dump = historic trash dumps

project components. Of these, 4 are within the ROW for sales gas pipeline alternative 2, and 1 is within the ROW for condensate and NGL pipelines alternative 1. Table 2-13 provides summary descriptions of these prehistoric cultural resources.

Nine historic cultural resources and several Oregon Trail segments were identified as being potentially affected by the alternative project components. The Bear River Divide segment of the Oregon Trail is crossed twice by the route for sales gas pipeline alternative 2, and other segments are either crossed or closely paralleled by the routes for gas gathering lines for wells 7, 8, and 9. Six other historic resources were identified within the ROW for sales gas line alternative 2. Table 2-14 provides summary descriptions of the identified historic cultural resources.

VISUAL RESOURCES

"Visual resources" is the term used to describe the physical characteristics of the landscape that determine its scenic quality and associated value to the viewing public. The objective of the visual resource analysis is to identify areas where significant contrasts with line, form, texture, and color would result from project development. The method of analysis is a standardized procedure used by the BLM for inventorying and evaluating visual resources. The procedure evaluates landscape features according to three basic criteria: scenic quality, distance zones, and sensitivity; and assigns a visual resource management priority to landscape subunits.

Geographic Area of Influence

The study area for the visual resource assessment for the Road Hollow proposed actions and alternatives includes landscapes within a 10-mile viewing area of the proposed plant site

and 3 miles on each side of pipeline, transmission line, and roadway alternatives.

Proposed Action

Landscape types within the study area are of two basic types: mountainous and alluvial valleys. The mountainous portion consists of large rolling hills with deeply incised creeks and streams. Vegetation in the mountainous area is primarily sagebrush along the crests, with some aspen and stands of conifers along north and east slopes and in ravines and valleys.

Vistas from viewing points on the upper elevations are expansive (20-30 miles) and open. Views from the lower valleys and ravines are enclosed by surrounding mountains and hills. Major human modifications in the study area include the Naughton Power Plant and associated coal mines; and the Whitney Canyon and Carter Creek gas plants. Access roads, pipelines, and an existing transmission line corridor are ancillary facilities in the study area associated with these plants.

Landscapes of high interest (sensitivity) include the corridors where historic trails have been identified (see the Cultural Resources section of this chapter). Specifically, the Oregon Trail has been identified along several locations in the study area. A marker has been placed by the BLM along the trail (Section 22, T20N, R119W) where the eastern access road and sales gas pipeline alternative 2 would cross the trail. Wagonwheel ruts and indentations are clearly evident along this portion of trail. Scenic vistas from the Bear River Divide are expansive and predominantly natural. The site-specific resource characteristics for landscapes affected by individual project components and alternatives are identified on completed contrast rating forms (Appendix D).

Alternatives

The study area for the alternatives contains the same visual resource characteristics as described for the proposed action.

TRANSPORTATION

Geographic Area of Influence

The geographic area of influence for the proposed action and alternatives includes the area within Lincoln and Uinta counties bordered by U.S. Highway 30N, U.S. 189, Interstate 80, and the Utah-Wyoming border.

Proposed Action

The northern boundary of the geographic area of influence, U.S. Highway 30N, provides access to the well field and proposed plant site from the community of Kemmerer via State Highway 89 and the existing Spring Creek (Red Eye) gravel road. U.S. Highway 189 borders the eastern side of the area of influence and could provide access from Kemmerer to the south, connecting with the proposed sulfur haul road at Elko, or connecting south with the existing haul road used by Amoco for trucking sulfur. Interstate 80 forms the southern border of the area of influence, connecting Evanston at the southwestern corner with U.S. 189 to the east, and running north to the Lincoln County line (see Map 11).

Roadway characteristics, traffic volume, and accident information are described below for each of the affected roads identified above.

U.S. 30N is a two-lane paved road running east-west between Kemmerer and Sage. A loop around the business portion of Kemmerer allows commercial vehicles on U.S. 30N to avoid having to pass through the community. Traffic volume, expressed in average daily trips (ADT), for the two segments of roadway between Sage Junction and Kemmerer is as follows:

Roadway Segments	All Vehicles, by Year		
	1979	1980	1981
First 22.3 miles	1330	1410	1450
Next 2 miles	2090	2170	2200

Roadway Segments	Commercial Vehicles, by Year		
	1979	1980	1981
First 22.3 miles	545	670	740
Next 2 miles	593	708	770

	Traffic Accidents (U.S. 30N), by Year		
	1979	1980	1981
Total Accidents	37	24	32
<u>Commercial Vehicles</u>	13	8	15

Source: Wyoming State Highway Department 1982.

Wyoming 51/80 is a two-lane paved road running east-west from the state line to U.S. 30N. Average daily traffic for this 4.1-mile section of road is as follows:

	1979	1980	1981
All Vehicles	660	750	800
Commercial Vehicles	124	132	150

Source: Wyoming State Highway Department 1982.

U.S. 189 is a two-lane road running north-south from I-80 to Kemmerer. Some 24.4 miles of U.S. 189 have been programmed for improvements (upgrading surface and widening) between 1983 and 1986. Traffic volume on this road over the past 3 years is as follows:

Average Daily Traffic

All Vehicles,
by Year

<u>Roadway Segments</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
21.4 miles from I-80 North to County Line	640	630	950
Next 7.4 Miles	670	660	990
Next 3.3 Miles	800	790	1240
Next 0.8 Mile	1130	1120	1560
Next 2.1 Miles	1720	1700	2300
Next 0.3 Mile	1770	1740	3150

Commercial Vehicles,
by Year

<u>Roadway Segments</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
21.4 miles from I-80 North to County Line	172	160	192
Next 7.4 Miles	178	165	196
Next 3.3 Miles	120	116	204
Next 0.8 Mile	121	109	218
Next 2.1 Miles	176	164	230
Next 0.3 Mile	181	171	250

Traffic Accidents (I-80
to Kemmerer), by Year

	<u>1979</u>	<u>1980</u>	<u>1981</u>
Total Accidents	51	54	38
Commercial Vehicles	8	10	7

Source: Wyoming State Highway Department
1982.

Several improved (gravel-surfaced) roads link the above major roads with the study area. The Spring Creek (Red Eye) Road (Map 1-1) provides access into the proposed plant site from the northeast (Wyoming 89) and is presently used by some workers who commute from Cokeville and eastern Idaho. This road has been the focus of concern expressed by the Wyoming Game and Fish Department because

a portion of it passes through a mule deer crucial winter range (refer to Wildlife section for more detailed discussion). The Amoco sulfur haul road provides access into the proposed plant site via a short section of the Dee Ranch Road and the Bear River Divide Road from Highway 189 approximately 25 miles south of Kemmerer (Map 1-1). Chevron and Amoco have ongoing agreements with Uinta County to maintain another gravel road between Evanston and Whitney Canyon and Carter Creek (Whitney Canyon Road) (Map 1-1).

It is approximately 55 miles between Kemmerer and Evanston, and takes approximately 1 hour to drive between the two communities on paved roads. The same trip on gravel roads takes over 1.5 hours at 45 miles per hour.

The other major transportation mode serving the study area is rail service. Union Pacific parallels U.S. 30N along the northern border of the study area and has a 12-mile spur running south near Kemmerer to the county line, serving the coal mining area, the AMOCO sulfur load-out facility and Naughton Power Plant.

Alternatives

Transportation resources (roads and rail service) for the alternatives are the same as those described for the proposed action.

RECREATION RESOURCES

Nonurban recreation resources include the managed areas and dispersed use areas that could be directly or indirectly affected by the construction, operation, maintenance, or abandonment phases of the proposed action or alternatives. By definition, this includes recreation lands actually traversed by the project, and those areas where project activities (such as construction noise, dust, air pollution, and odor) might be noticeable enough to affect the quality of the recreation experience at nearby recreation sites. Also included in the recreation

inventory are recreation use areas and attractions where increased visitor use related to the project work force could affect the recreation resources.

Geographic Area of Influence

For this assessment, the recreation inventory includes dispersed recreation activities on lands occupied by the proposed actions and alternatives, as well as recreation areas within 100 miles (one day recreation commute) from potentially affected communities, such as Kemmerer and Evanston. Table E-1 in Appendix E indicates the major recreation areas within the area of influence, their size and location by county and state, and the managing agencies.

Proposed Action

Recreation resources are common to all of the proposed project components in the study area and thus will not be repeated under separate facility headings.

The proposed gas treatment plant, access roads, gas gathering system, and transmission line would be located approximately 20 miles west-southwest of Kemmerer in Lincoln County, which falls within state Recreation Planning Region 7. Table E-2, Appendix E, summarizes the rural outdoor recreation facilities for Planning Region 7, which includes Lincoln, Sublette, Sweetwater, and Uinta counties.

The public lands in the immediate vicinity of Kemmerer can be characterized as open expanses of semiarid country. To the west and north of Kemmerer the terrain is more mountainous, with alpine and subalpine forested areas. Recreation activities within the study region are primarily dispersed types of uses. The recreational values associated with these types of uses are closely tied to the open space and relatively natural condition of most of the area. Major recreational uses in the area include fishing, hunting, camping, hiking, picnicking, sightseeing, and an ever-expanding variety of off-road-vehicle activities.

Table E-3, Appendix E, indicates the estimated participation days for each recreation activity for 1979 and 1990.

Alternatives

Recreation resources for the alternatives are the same as those identified and described for the proposed action above and in Appendix E.

SOCIOECONOMIC CONDITIONS

Geographic Area of Influence

The socioeconomic study was designed to focus on the area within which the major socioeconomic impacts resulting from the construction and operation of the proposed action and alternatives would be likely to occur. The identification of the geographic area of influence concentrated on defining the potential areal extent of substantial project-related changes. For the proposed action, the analysis focused on Kemmerer and Diamondville in Lincoln County, and Lincoln County School Districts No. 1 and No. 2. The analysis of alternatives included an examination of Evanston and Uinta County School District No. 1.

The following information is summarized from the Socioeconomic Technical Report. Refer to the technical report for complete references.

Proposed Action

Energy resources have continued to play a key role in the development of both Kemmerer and Diamondville since their establishment in conjunction with area coal mining. In the 1960s, the construction of an electric generating station and a coke production plant near the communities and the development of a railroad switching yard in Kemmerer served to reverse an economic decline that had begun in the 1930s. In the 1970s and 1980s, increased oil and gas exploration and development in the region further stimulated the local economy and increased the rate of population growth.

Population. Recent population trends for Lincoln County, Kemmerer, and Diamondville are illustrated in Table 2-15. As shown, the total population increased most rapidly between 1970 and 1980. In addition, estimates of the 1982 Kemmerer-Diamondville population (5260) indicate that population growth, which began in the 1970s in response to oil and gas exploration and development, has continued at an increased rate into the 1980s.

Population projections for the Kemmerer-Diamondville area are shown in Table 2-16. According to these figures, the combined population of both towns is projected to increase by approximately 6.8 percent between 1982 and 1986.

Economy and Employment. In the 1980s, the economic base of Diamondville and Kemmerer continued to rely on energy-related industries. Major employers in the area include two coal mines and a coking plant, an electric generating station, a phosphate processing plant, and two natural gas processing facilities. As shown in Table 2-17, the mining and construction sectors of the Kemmerer and Diamondville economy accounted for 30 percent and 15 percent, respectively, of the communities' total employment in 1981, and 44 percent and 16 percent, respectively, of the total payroll during the same time period.

Average annual employment (by place of work) for the geographic area of influence has increased substantially since the early 1970s. For example, the total number of jobs has risen approximately 65 percent from 1407 jobs in 1973 to over 2325 jobs in 1981. As shown in Table 2-18, the unemployment rate for Lincoln County (which has averaged 2.3 percentage points above the rate for Wyoming during the same time period) has generally risen since 1979. Likewise, the unemployment rate among Kemmerer and Diamondville residents has also increased, due primarily to layoffs at a nearby coal mine and to the completion of the Chevron Carter

Creek and Amoco Whitney Canyon gas processing plants.

Table 2-19 shows projections of total employment by industrial sector for Lincoln County, which reflect employment activity for Kemmerer and Diamondville as well. As shown, while total employment in the county is projected to increase by an estimated 6.6 percent (450 jobs) between 1982 and 1986, the percentage distribution of those jobs is expected to remain fairly constant..

Housing. Recent estimates and inventories of dwelling units in Kemmerer and Diamondville are shown in Tables 2-20 and 2-21. While the number of new housing units in those communities has increased substantially in response to the growing demands placed on the housing market by in-migrants, the total number of new housing units has not kept up with the increased demand. The vacancy rate in the Kemmerer-Diamondville area was estimated at less than 1 percent in 1982, compared with 10.6 percent for the entire county.

The construction of additional housing in Kemmerer is a priority for local officials, who are actively working to enhance residential development through annexing developable land, constructing major access roads into developing areas, planning public services and facilities to accommodate increased growth, and working cooperatively with subdividers and builders. (Because growth in Diamondville is constrained by the limited availability of buildable land, the major population growth in the communities is expected to occur in Kemmerer.)

The planned construction of 300 single and multiple-family dwelling units in an existing subdivision in Kemmerer represents the major addition to the area's housing supply during the construction of the Road Hollow project (D. Johnson 1982). In addition, a motel/hotel developer is planning to construct a 96- to 100-room complex in Kemmerer by 1984,

Table 2-15. POPULATION CHANGE, LINCOLN COUNTY, KEMMERER AND DIAMONDVILLE: 1950-1980

	1950	Average Annual % Change (1950-1960)	1960	Average Annual % Change (1960-1970)	1970	Average Annual % Change (1970-1980)	1980
Lincoln County	9023	(.01)	9018	(.43)	8640	3.5	12,177
Kemmerer	1667	2.0	2028	1.2	2292	3.6	3,273
Diamondville	415	(.42)	398	2.0	485	7.5	1,000
Kemmerer- Diamondville TOTAL	2082	1.8	2426	1.4	2777	4.4	4,273

Source: Briscoe, Maphis, Murray and Lamont, Inc. 1982a.

Note: Parentheses indicate a negative change.

Table 2-16. POPULATION PROJECTIONS, KEMMERER-DIAMONDVILLE: 1982-1990

Kemmerer-Diamondville	1982	1983	1984	1985	1986	1987	1988	1989	1990
Primary Population ^a	5260	5380	5468	5545	5616	5730	5815	5914	5971
Peak Population ^b	554	423	458	278	351	289	518	666	655
Total Population ^c	5814	5803	5926	5823	5967	6019	6333	6580	6626

Source: Briscoe, Maphis, Murray and Lamont, Inc. 1982b.

^aPrimary population is the average annual population estimated by the Wyoming Population Model, based on input from the OIA Monitoring System regarding oil and gas employment man-years.

^bPeak population includes oil and gas employees in temporary quarters while on assignment in locations beyond daily commuting distance from their primary place of residence.

^cTotal population is the sum of primary population and peak population.

Table 2-17. EMPLOYMENT, TOTAL PAYROLL, AND AVERAGE WEEKLY WAGE BY INDUSTRY BY PLACE OF WORK, KEMMERER AND DIAMONDVILLE: 1981

Industrial Sector	Number of Employing Units	1981 Employment			Total Payroll (July - September)	Average Weekly Wage
		July	August	September		
Mining	14 (7.6)	711 (30.9)	721 (30.0)	645 (27.1)	\$ 4,606,559 (44.0)	\$510.66
Construction	38 (20.5)	345 (15.0)	379 (15.7)	346 (14.6)	1,655,136 (15.8)	356.69
Manufacturing	13 (7.0)	222 (9.7)	228 (9.5)	239 (10.1)	765,970 (7.3)	256.51
Transportation/Communication/Utilities	10 (5.4)	201 (8.7)	205 (8.5)	206 (8.7)	1,207,797 (11.5)	455.00
Wholesale Trade	8 (4.3)	73 (3.2)	73 (3.0)	70 (2.9)	271,140 (2.6)	290.27
Retail Trade	46 (24.9)	299 (13.0)	323 (13.4)	292 (12.3)	522,090 (5.0)	139.48
Finance/Insurance/Real Estate	10 (5.4)	91 (4.0)	94 (3.9)	81 (3.4)	263,137 (12.5)	228.42
Services/Agricultural/Forestry	38 (20.5)	239 (10.4)	260 (10.8)	380 (16.0)	798,151 (17.6)	209.58
Public Administration	8 (4.3)	117 (5.1)	124 (5.2)	117 (4.9)	384,457 (13.7)	248.05
TOTAL	185 (99.9)	2298 (100.0)	2407 (100.0)	2376 (100.0)	\$10,474,437	—

Source: Paul Nelson Associates, Inc. 1982.

Note: Numbers in parentheses indicate the percentage of the total for each column.

Table 2-18. UNEMPLOYMENT RATE AND AVERAGE ANNUAL LABOR FORCE BY PLACE OF RESIDENCE,
WYOMING AND LINCOLN COUNTY: 1972-1982

Place	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Sept. 1982	Oct. 1982
Unemployment Rate:												
Lincoln County	6.1	5.6	4.7	6.4	6.2	6.5	5.7	4.8	6.5	5.6	8.2	10.4
Wyoming	3.8	3.3	3.4	4.2	4.1	3.6	3.3	2.7	3.9	4.1	5.4	6.3
Average Annual Labor Force:												
Lincoln County	3,334	3,408	3,860	4,005	4,415	4,818	5,199	4,910	5,020	5,640	6,156	5,830
Wyoming	135,800	142,985	153,072	165,869	179,080	193,000	208,000	223,000	232,000	250,000	257,793	253,446

Source: Wyoming Employment Security Commission 1982.

Table 2-19. TOTAL EMPLOYMENT BY INDUSTRIAL SECTOR, LINCOLN COUNTY: 1980-1990

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Agriculture	218 (3.6)	218 (3.3)	218 (3.2)	218 (3.1)	218 (3.0)	218 (3.1)	218 (3.0)	218 (2.9)	218 (2.9)	218 (2.8)	218 (2.9)
Mining/ Construction*	1839 (30.0)	2089 (31.9)	2113 (30.9)	2260 (32.2)	2365 (32.8)	2197 (30.9)	2293 (31.5)	2353 (31.8)	2436 (32.2)	2686 (34.0)	2334 (30.8)
Manufacturing	438 (7.1)	455 (7.0)	485 (7.1)	489 (7.0)	497 (6.9)	505 (7.1)	514 (7.1)	520 (7.0)	530 (7.0)	537 (6.8)	542 (7.2)
Transportation	457 (7.4)	475 (7.3)	505 (7.4)	510 (7.3)	518 (7.2)	526 (7.4)	536 (7.4)	543 (7.3)	553 (7.3)	560 (7.1)	565 (7.5)
Trade	787 (12.8)	811 (12.4)	862 (12.6)	871 (12.4)	883 (12.3)	896 (12.6)	912 (12.5)	922 (12.5)	938 (12.4)	950 (12.0)	958 (12.6)
Finance	154 (2.5)	207 (3.2)	226 (3.3)	228 (3.2)	238 (3.3)	254 (3.6)	258 (3.5)	270 (3.7)	280 (3.7)	290 (3.7)	296 (3.9)
Services	345 (5.6)	388 (5.9)	415 (6.1)	418 (6.0)	429 (6.0)	444 (6.3)	452 (6.2)	462 (6.2)	474 (6.3)	484 (6.1)	491 (6.5)
Government	870 (14.2)	906 (13.8)	964 (14.1)	973 (13.9)	988 (13.7)	1005 (14.1)	1023 (14.0)	1036 (14.0)	1056 (13.9)	1070 (13.6)	1079 (14.2)
Other	1033 (16.8)	996 (15.2)	1049 (15.4)	1061 (15.1)	1067 (14.8)	1063 (15.0)	1083 (14.9)	1082 (14.6)	1092 (14.4)	1096 (13.9)	1100 (14.5)
Total*	6141 (100.0)	6545 (100.0)	6836 (100.0)	7027 (100.0)	7203 (100.0)	7109 (100.0)	7290 (100.0)	7407 (100.0)	7576 (100.0)	7892 (100.0)	7853 (100.0)

Source: Briscoe, Maphis, Murray and Lamont, Inc. 1982b.

Note: Numbers in parentheses indicate the percentage of the total for each column.

*Total employment as estimated by Wyoming Population Model, based on input from OIA Monitoring System regarding oil and gas employment. Estimates of 1980-1990 employment in sectors other than agriculture, mining, and construction adjusted for leads and lags vis-a-vis annual increase. Monitoring system projections of oil and gas employment included in mining and construction sectors.

Table 2-20. ESTIMATED HOUSING UNITS BY TYPE, KEMMERER: 1982

Type of Unit	Number of Units	Percent of Total	Occupancy Factor	Resident Population	Percent of Total
Temporary ^a	429	24.3	1.75	751	14.4
Mancamp	111	6.3	3.91 ^b	433	8.3
Motel-Sleeper	318	18.0	1	318	6.1
Permanent	1340	75.7	3.33	4470	85.6
Single-Family	761	43.0	3.4	2590	49.6
Apartment	250	14.1	2.9	726	13.9
Mobile Home	329	18.6	3.5	1154	22.1
Total (All Units)	1769	100.0	2.95	5221	100.0

Source: Paul Nelson Associates, Inc. 1982.

^aThe 111-unit mancamp facility will be removed from Kemmerer by December 1982.

^bMancamp occupancy factor estimated by PNAI allows for 2 percent vacancy rate.

Table 2-21. HOUSING UNITS BY TYPE, DIAMONDVILLE: 1973, 1975, 1977, and 1980

Type of Unit	1973		1975		1977		1980	
	Number of Units	Percent of Total	Number of Units	Percent of Total	Number of Units	Percent of Total	Number of Units	Percent of Total
Single-Family	130	64.4	145	55.5	144	43.8	160	44.8
Multiple-Family	8	4.0	11	4.3	14	4.2	19	5.3
Mobile Home	<u>64</u>	<u>31.6</u>	<u>105</u>	<u>40.2</u>	<u>171</u>	<u>52.0</u>	<u>178</u>	<u>49.9</u>
TOTAL	202	100.0	261	100.0	329	100.0	357	100.0

Source: LUAG 1977; Census Retrieval Information Service 1981.

and local motel and apartment owners are planning to add 60 new apartments and 30 new motel rooms to existing facilities in 1983 (D. Johnson 1982).

Public Services and Facilities. Kemmerer, Diamondville, Lincoln County, and Lincoln County School District No. 1 are the major providers of public services and facilities to Kemmerer and Diamondville residents. (See the Socioeconomic Technical Report for a detailed description of water, wastewater, solid waste disposal, law enforcement, fire protection, public education, streets, health services, community parks and recreation, social services, and libraries.) In general, no public services or facilities in those communities were experiencing severe or critical staffing, facilities, or funding shortfalls in 1982. Moreover, with the exception of social service agencies (whose future funding sources are uncertain), public service providers do not foresee any significant problems in accommodating increased demands resulting from the projected population growth in the absence of the Road Hollow project.

By the time construction would begin on the Road Hollow project, the public service and facility providers will have completed a large number of major projects that will serve to significantly improve the type and quality of public services and facilities available to Kemmerer and Diamondville residents. Both towns, the county, and the school district have exhibited an assertiveness in upgrading public services and facilities and in planning to meet continued growth. Moreover, the communities have demonstrated their ability to seek practical and innovative solutions in responding to local needs and to generate necessary revenues for capital improvements.

Alternatives

The population of Evanston, the largest city in Uinta County, is approximately twice the size of Kemmerer and 1.5

times the combined population of Kemmerer and Diamondville. In 1980, the population of Evanston was 6420 compared to 3273 for Kemmerer and 4274 for Kemmerer and Diamondville. Like most communities in southwestern Wyoming, the number of residents and the rate of population growth increased substantially during the 1970s and early 1980s due primarily to oil and gas exploration and development. In addition, those increases are expected to continue. According to a forthcoming OIA Monitoring System Report No. 2, the cumulative population of Evanston (which includes permanent residents as well as temporary oil and gas workers) is projected to be 10,576 in 1983, 11,210 in 1984, 13,008 in 1985, and 12,530 in 1986.

In March 1982, the total number of permanent dwelling units in Evanston was estimated to be 2987 (compared to approximately 1700 for Kemmerer and Diamondville). Of those, single-family structures accounted for 59.7 percent, mobile homes comprised 25.1 percent, and multiple-family units and duplexes contributed 15.2 percent. In addition, there were 1093 hotel and motel rooms. The size of Evanston's housing stock increased significantly during the 1970s and early 1980s in response to the area's rapid economic growth. During the construction of the Carter Creek and Whitney Canyon gas processing plants and increased oil and gas exploration activities, housing demand exceeded housing supply, and vacancy rates were low. However, by 1982 the period of rapid growth had begun to stabilize due to the reduction in oil and gas exploration activities, the completion of the gas processing plants, and the national recession. As a result, the decrease in housing demand in combination with the completion of major additions to the housing supply allowed Evanston's housing supply and demand to normalize. It is estimated that in 1982, the occupancy rate of area hotels and motels dropped to 70 to 75 percent in the summer and 40 percent in the winter. While no new major hotel or

motel additions or expansions are planned for the near future, the construction of permanent housing is continuing, albeit at a reduced level.

Local planners and agency representatives confirm that the most important socioeconomic impacts resulting from the Road Hollow project could occur to Evanston's public schools and social services. The school-age population of Evanston is served by Uinta County School District No. 1, which encompasses the northern portion of Uinta County. The district includes four elementary schools (Brown, Clark, East, and Uinta Meadows), one middle school (Davis), and one high school (Evanston). According to the district's assistant superintendent, most schools have been experiencing substantial increases in enrollments since the late 1970s and are operating at or above capacity during the 1982/1983 school year. (For example, October enrollments for the 1981/1982 and 1982/1983 school years were as follows: elementary--1233 in 1981 and 1647 in 1982; middle school--472 in 1981 and 668 in 1982; and high school--512 in 1981 and 624 in 1982.) The additional students are accommodated through the use of portable and modular classroom units. While two new elementary schools and one new high school are scheduled to open in the next three years (North Evanston Elementary in the fall of 1983, Aspen Elementary in the fall of 1984, and the high school in the fall of 1985), it is not anticipated that there would be significant excess capacity to accommodate large increases in the district's school-age population. The con-

struction program is primarily aimed at providing adequate facilities for current enrollment.

Social services are provided to Evanston residents through a variety of public agencies and private groups (principally churches and service organizations). Nine publicly funded agencies with offices in Evanston were identified and are available to provide various public services.

The following facilities, staff, and programs were identified by the Uinta County Human Resources Coordinator as necessary to adequately meet the demands of the existing population in the agencies' service area:

- Program and staff for troubled youth
- Additional staff and a shelter facility for the physical violence program
- Poly-drug medical detoxification program
- Crisis intervention network

Several social service agencies were considered to be operating at or near capacity in 1982. Moreover, it was the opinion of the Human Resource Coordinator that the demand for social services would continue to grow as the population in their service area increases and as public awareness of the programs becomes more widespread. At the same time, however, it is anticipated that federal funds will continue to be reduced, thereby making future funding sources uncertain.

Chapter 3

ENVIRONMENTAL CONSEQUENCES

ENVIRONMENTAL IMPACTS

Impact assessments were conducted for all resources described in Chapter 2. Impacts were evaluated based on the indicators of impact significance identified for each resource topic. This EA focuses on those impacts with the most potential for approaching these indicators of significance. Other less important impacts are identified but are given less emphasis. Technical reports were prepared for two resource topics (wildlife and socioeconomics) for which the largest number and greatest magnitude of impacts are expected. Discussion of impacts is not repeated for alternatives if they would be similar to those discussed for the proposed action. Instead, similar impacts are summarized in the section on summary and comparison of impacts for alternatives including the proposed action in Chapter 1. Appendix A presents the other projects considered in the cumulative impact analyses.

CLIMATE, AIR QUALITY, AND NOISE

Indicators of Impact Significance

Air quality impacts were assessed by examining pollutant emissions from construction activities and plant operation and by estimating increases of ambient concentrations for those pollutants emitted in appreciable amounts. Concentration increases were estimated using dispersion modeling techniques approved by the EPA.

Noise impacts were estimated using mathematical techniques that are explained in detail later in this section.

Impacts were assessed with respect to the following indicators of impact significance:

- Temporary air quality impacts, such as from construction, were considered to be potentially significant if sensitive receptors, such as residences, could be affected.
- Long-term air quality impacts, such as from operation, were considered significant if federal or state ambient air quality standards would be violated. Comparison to ambient air quality standards was accomplished with a two-step approach. First, as a screening step, estimated pollutant emissions were compared with de minimis emission levels (glossary) defined in EPA regulations for Prevention of Significant Deterioration (PSD). (It should be noted that comparison to PSD de minimis levels was used only as a screening step and that because of the small amounts of pollutants to be emitted, PSD regulations do not apply to the proposed project.) Pollutants emitted in amounts less than the de minimis levels would not produce significant concentration increases. Pollutants emitted in amounts greater than the de minimis emission levels were input to EPA-approved dispersion models to predict the increase in

ambient concentration. Total predicted future ambient levels were achieved by combining existing background levels with the predicted increase. These total predicted concentration levels were then compared with the ambient standards to determine if the standards would be exceeded.

- Noise impacts were evaluated with respect to health and activity interference. In assessing the perceptual impacts of noise, the effect of the noise depends on the noise source itself as well as on the personal characteristics and the activities of the individuals hearing the noise. The proposed project would be located in an isolated area, and the majority of people exposed to noise from the project would be employees. Thus, sensitive receptors are defined as those in residential or other populated areas (i.e., non-employee related). Noise impacts are considered to be potentially significant if the day-night scale (L_{dn}) noise level at sensitive receptors is greater than 55dB(A). This level is recommended by the EPA (1974) as requisite to prevent impairment to conversation. The level of 70 dB(A) or less is recommended by EPA (1974) as requisite to protect human hearing.

Proposed Action

Construction. The principal source of air pollution would be fugitive dust emissions from earthwork and engine exhaust from construction equipment. Uncontrolled fugitive dust emissions from construction work were estimated to be 1.2 tons per acre per month (EPA 1979). Emissions from engine exhaust would be a relatively minor source of air pollution. Construction-related emissions would be spread over the entire construction area and would cease upon completion of construction. These emissions would not be expected to significantly affect ambient air quality.

Construction impacts would also include temporary increases in noise levels in the project area due to the operation of heavy equipment. Heavy equipment and construction activities typically produce noise levels of approximately 90 decibels at a distance of 50 feet from the source (EPA 1974). These levels would decrease to the level of normal conversation, approximately 60 decibels, within about one-quarter mile of the source, assuming an attenuation rate of 6 decibels per doubling of distance. These impacts would cease upon completion of construction. The project area is rural in nature, and no residences would be affected.

Operation. Operational impacts would be caused primarily by the gas processing plant. Transport of sulfur by truck would cause only minor emissions. Each 40 million scfd module would have the following pollutant release points:

- Boiler stack
- Emergency flare
- Mole Sieve Regenerator
- Incinerator stack
- Diesel generator

Emissions data are presented in Table 3-1. The only pollutant to be emitted in amounts greater than the de minimis emission level would be SO_2 .

The increase in ambient SO_2 concentration due to plant operation was estimated using dispersion modeling techniques approved by the EPA. Annual average concentration increases were estimated using the VALLEY model. This model is discussed in detail by Burt (1977). Short-term concentration increases were estimated using the PTMAX model, discussed by Turner and Busse (1973).

Meteorological data for the VALLEY model simulation consisted of joint frequency distribution of wind speed, wind

Table 3-1. EMISSION DATA FOR THE 80 MILLION SCFD GAS TREATMENT PLANT

Emission Parameter	Incinerator	Mole Sieve Regenerator	Boiler	Flare	Diesel Generator ^a
Number of Stacks	2	2	2	2	2
Stack Height (ft)	150	45	45	150	45
Stack Diameter (in)	24	10	12	30	10
Exit Velocity (ft/sec)	11 ^b	38	62	100 ^c	138
Exit Temperature (°F)	450	360	400	1,300	1250
Gas Rate (scfm)	838 ^b	520	1190	27,780 ^c	960
Gas Molecular Weight		28	28		
Emission Rate (lb/hr) ^d					
Hydrocarbons (as CH ₄)	-	0.016	0.034	-	2.76
Particulates	-	0.08	0.18	-	2.92
SO ₂	11.24	0.004	0.006	1405	2.60
NO _x	-	1.16	2.64	-	34.52
CO	-	0.08	0.20	-	7.50
Release Period	Continuous	4 hr/d	Continuous	Emergency	Emergency

^aRuns only during power outages. Approximately 0.5 percent of the time.

^bIncinerator stack sized for emergency operation. Figure shown is for normal gas flow.

^cEmergency operation only. Normally not flaring.

^dPounds per hour x $\frac{\text{hours of operation}}{2,000}$ = tons per year.

direction, and atmospheric stability class based on 5 years of data collected at Rock Springs. Worst-case conditions of Class 2 stability and 0.5 meter per second (m/s) wind speed were used in the short-term simulations. Class II stability corresponds to moderately unstable or turbulent conditions.

Results of the dispersion modeling simulations are summarized in Table 3-2 along with applicable federal and state ambient air quality standards. Concentration isopleths of the annual average SO₂ impacts are shown in Figure 3-1. Operation of the plant would not cause a violation of any applicable air quality standards and thus no significant impact is expected.

Noise sources during operation would include pumps, process equipment, and vehicles. Noise from these sources is expected to be minor and to affect only the immediate vicinity. No residences would be affected by project operation.

Cumulative Impacts. The increases in ambient pollutant levels as a result of this project would be too low to cause any appreciable cumulative impact with Chevron's Carter Creek and Amoco's Whitney Canyon gas processing plants, the only other significant emission sources in the area.

Alternatives

Processing and Disposal of Hydrogen Sulfide. The wellhead gas would have H₂S concentrations not exceeding 0.5-0.6 percent. Design flexibility would be provided to process up to 1.0 percent H₂S, resulting in a doubling of SO₂ emissions, for a total of 98.4 tons per year (t/yr). Project impacts as reported in Table 3-2 would also double. However, resulting impacts would still be well below all applicable air quality standards and no significant impacts would occur.

An alternative to the proposed Claus sulfur recovery and tail gas cleanup for

H₂S is the ammonium thiosulfate process (ATS). Emissions from the process would be 54 t/yr of SO₂ and 500 ppm ammonia (NH₃) from the absorber stacks. These SO₂ emissions would be only slightly higher than the 49 t/yr level for the proposed project and are not expected to result in any significant impacts. There is no ambient air standard for NH₃. The 500-ppm release concentration is expected to be sufficiently dispersed before reaching ground level to be below the 46.8-ppm threshold required for odor detection (Leonardos et al. 1969).

GEOLOGY AND MINERALS

Indicators of Impact Significance

Impacts were considered significant if:

- Project structures would be located on known active faults or in areas where there is potential for strong ground motion or a reasonably high potential for earthquake-induced ruptures that would cause structural damage to project facilities; and structural damage would result in potential significant effects to health and safety
- Project structures or equipment would be located in landslide-prone areas, avalanche-prone areas, or in areas with potential for subsidence, where damage to structures or equipment would result in significant effects to health and safety
- Project structures would be located in areas where extraction of minerals may produce surface collapse or subsidence that would cause equipment failure resulting in significant effects to health and safety

Proposed Action

Geologic Hazards. Potential geologic hazards in the Road Hollow Unit Area include seismic hazards and rock avalanches or landslides. Earthquakes associated with active faulting in the region could generate two types of seismic hazard: surface rupture and ground shaking. The

Table 3-2. MODELING RESULTS FOR SULFUR DIOXIDE (80 MILLION SCFD PLANT)

Averaging Period	Increase	Background	Total Predicted	Standards	
				State	Federal
3 Hours	40	8 ^a	48	1300	1300
24 Hours	26	5 ^b	31	260	260
Annual	0.2	1 ^b	1.2	60	60

Note: All measurements are micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

^aNo 3-hour monitoring data for SO_2 were available. Value extrapolated from 24-hour level.

^bMaximum value monitored at Kemmerer by DEQ between 1976 and 1978.

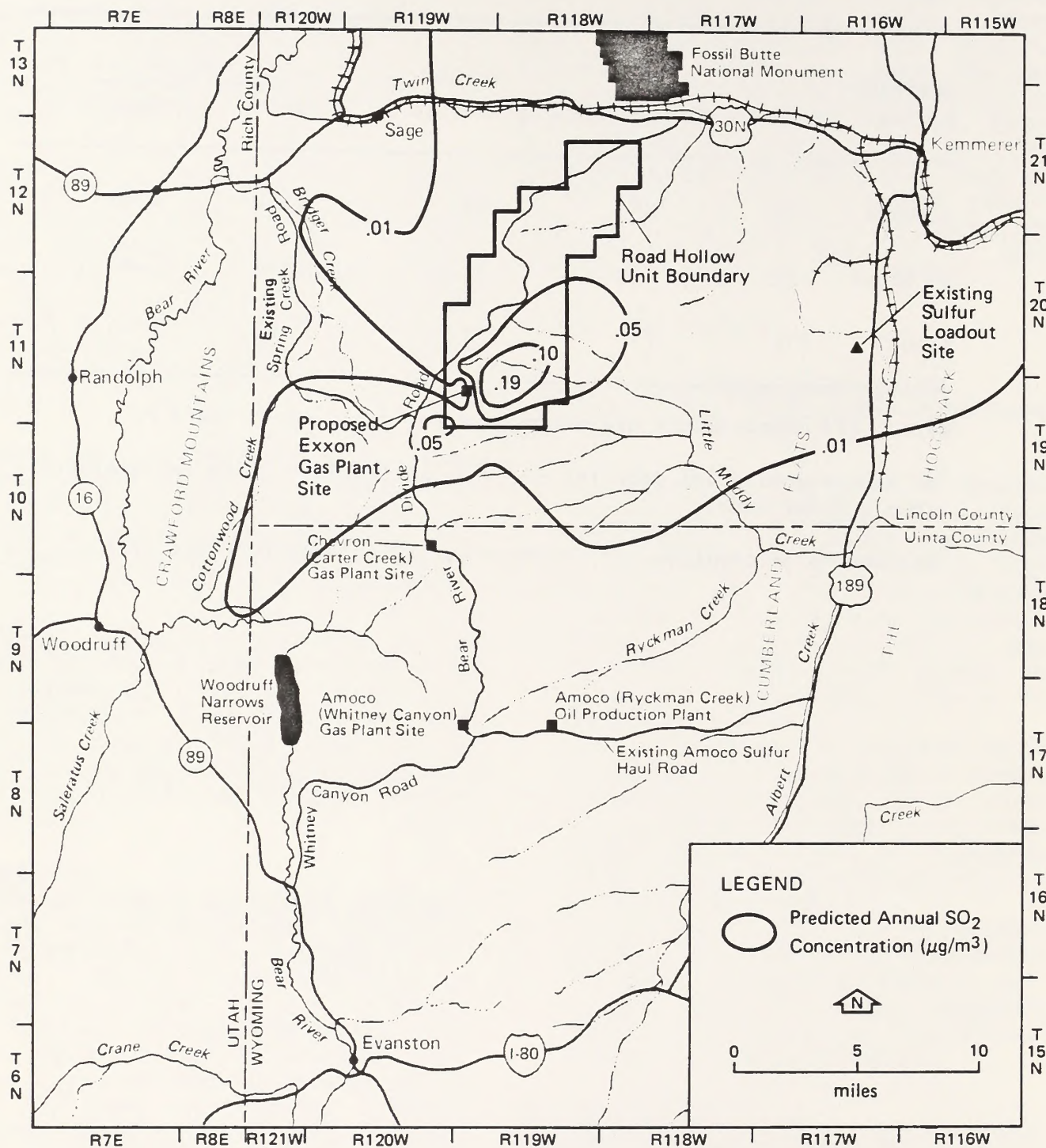


Figure 3-1. PREDICTED ANNUAL SO₂ CONCENTRATION

potential for surface rupture to damage structures requires that active faulting occur beneath or very near a structure whereas damage induced by ground shaking could be initiated from earthquakes located miles away. Earthquakes could also trigger rock avalanches or landslides (Abarasz et al. 1979). Landslides could also occur under static conditions in the absence of earthquakes.

The nearest known possible source of surface faulting is the Rock Creek Fault. The projection of this fault toward the proposed gas treatment plant is in part covered by unfaulted Quaternary landslides; thus, the potential for damage due to surface rupture at the proposed plant site is undetermined.

A number of sources of seismic shaking exist in the general region, and several are within the geographic area of influence. The long linear extent (24 miles) of the Rock Creek Fault and its nearness to the proposed plant site and other project components indicate that it would be the most likely source of potential damage to the proposed plant. Assuming worst-case conditions, seismic shaking could cause ground acceleration that would exceed the design criteria for American National Standard Institute (ANSI) seismic zone 2 and thus some damage to structures could result. Given the relatively short operating life of the proposed facilities (15 to 20 years) and the relatively long expected recurrence interval of a maximum magnitude event on this fault (several hundred to two thousand years), the likelihood of occurrence of worst-case conditions during the life of the project is expected to be small. If structural damage would result from a maximum magnitude earthquake, there would be some potential for release of untreated H₂S gas. Potential impacts to health and safety and wildlife populations that could result if H₂S gas is released are discussed in the Health and Safety analysis and in the impact analysis for Wildlife.

Another source of potential seismic shaking in the geographic area of influence is the alignment of microearthquakes northeast of the proposed plant site. Although a maximum magnitude earthquake along this trend would generate lower ground motions than the Rock Creek Fault, ground accelerations at the proposed plant site could exceed the ANSI seismic zone 2 design criteria. If structural damage would result from worst case conditions on this trend, and if untreated H₂S gas was released, the potential impacts to health and safety and wildlife populations are discussed in the appropriate sections of this chapter.

Landslides or rock avalanches could affect project components (Table 3-3). Numerous inactive faults exist in the site region; however, these may only represent zones of weakness in the rock and, like swelling clays, present little real hazard.

Minerals. Approximately 80 million scfd of nonrenewable gas resources would be processed and consumed. An estimated 120,000 cubic yards of aggregate (gravel) would be needed for the proposed action. Most of the aggregate is expected to come from available sources.

PALEONTOLOGICAL RESOURCES

Indicators of Impact Significance

Paleontological resources are a non-renewable resource of scientific, educational, and cultural value. There is no widely accepted definition of significance of paleontological resources for environmental assessments. As a general rule, however, all vertebrate fossils are considered significant unless a trained paleontologist voices a contrary opinion. Invertebrate and plant fossils tend to occur in greater abundance than vertebrate fossils. These fossils are generally not considered significant unless they can provide unusually important information, are unique to a particular

Table 3-3. PROJECT COMPONENTS EXPOSED TO POTENTIAL GEOLOGIC HAZARDS

Potential Hazard	Plant Site	Gathering Lines	Sales Gas Pipeline	Condensate and NGL Pipelines	H ₂ S Processing and Disposal	Water Supply	Electric Power Supply	Access
<u>Seismic Rupture or Ground Shaking</u>								
Proposed Action	Surface rupture or seismic shaking generated by activity on the Rock Creek fault (5 miles north-west of proposed site) may be capable of damage to site structures and pipes.	Same as proposed plant site	No hazard identified	No hazard identified	No hazard identified	No hazard identified	No hazard identified	No hazard identified
Alt. 1		Same as proposed plant site	No hazard identified	No hazard identified	No hazard identified	No hazard identified	No hazard identified	No hazard identified
Alt. 2			Reactivation of faulting along existing traces of the Rock Creek fault that are crossed at MP 8.0, 11.0, 12.0, and 13.8 could damage the pipeline.		No hazard identified			
Alt. 3, 4, and 5					No hazard identified			
<u>Landslides/Rock Avalanches^{a,b}</u>								
Proposed Action	No hazard identified	Potential landslides/rockfall areas include portions of the gathering lines for well numbers 9, 10, 11, 12, and 13		Potential landslides/rockfall areas include MP 2.7-2.9, 10.0-10.6, 11.0-11.7, 12.7-13.0, 17.2-17.9, 18.0-18.2, 18.7-19.2	Potential landslides/rockfall areas include MP 3.0-6.0, 6.7-8.3, 14.0-15.0	No hazard identified	Potential landslide/rockfall area MP 0.8-2.0	Same as proposed action, H ₂ S processing and disposal
Alt. 1		Potential landslides/rockfall areas include portions of the gathering line for well number 9	Potential landslides/rockfall areas include MP 2.7-2.9, 10.0-10.6, 11.0-11.7, 11.0-11.7, 12.7-13.0	Same as proposed action	No hazard identified	No hazard identified	No hazard identified	No hazard identified
Alt. 2			Potential landslides/rockfall areas include MP 5.0-5.5, 12.8-12.9, 13.2-13.3		Same as proposed action and alternative 1			
Alt. 3, 4, and 5					Same as proposed action and alternative 1			

^aIncludes seismically activated landslides or rock avalanches.^bAreas designated as potential landslide/rockfall are where components would cross steep slopes on material of questionable competency.

geographic location, or are in short supply.

The sensitivity of the paleontological resources of an area to disturbance is related to factors that include the scientific value of the fossils, their condition of preservation, their abundance within the area, and potential for direct disturbance (related to the amount of overburden that may overlie the bedrock). Geologic units within the proposed project area have been classified using the following sensitivity ratings:

- High sensitivity: where abundant significant fossil assemblages or individual fossils have been recovered; or where there is a high probability that the project development would cause direct disturbance to material exposed at the surface, or interfere with the future recovery of potentially significant fossils.
- Moderate sensitivity: where significant fossils are known to occur in low abundance; or where there is a moderate probability that development would result in direct disturbance to material exposed at the surface, or interfere with the future recovery of potentially significant fossils.
- Low sensitivity: where fossils are extremely rare or only insignificant fossils are known to occur.

Proposed Action

Direct and indirect impacts to paleontological resources are expected to result from construction of the proposed project. Significant fossils within geologic units assigned a high sensitivity rating may be adversely affected by direct impacts; however, the potential for this occurrence is small, given implementation of the management plan described in Chapter 1. Most direct impacts result from bedrock disturbances by heavy construction machinery. Direct impacts can affect fossils located at the surface and below the surface to the depth of bedrock disturbance. Bedrock

disturbance may lead to the recovery of fossils that would not otherwise have been discovered; however, their scientific value is often severely diminished.

The Fossil Butte Member of the Green River Formation and portions of the main body of the Wasatch Formation have been assigned high sensitivity ratings within the proposed project area. Locations where sensitive geologic units may be affected are:

- The entire ROW for gas gathering lines for wells 9, 10, 11, and 13 (1.7, 1.9, 1.3, and 1.6 miles, respectively)
- Eastern access road ROW (MP 3.2-5.0, 17.0-18.0)

Bedrock that may contain significant fossils is unlikely to be affected by project components that are restricted to ridgetops in the central and southern portions of the proposed project area (north of the Lincoln-Uinta county line).

Indirect impacts are defined as secondary disturbances of paleontological resources, which occur largely after construction activities have been completed. Typically, these impacts occur as a result of increased human access and activity within an area. Indirect impacts include intentional destruction of fossils through vandalism; unintentional destruction by off-road vehicular traffic; and theft, either by private collectors and hobbyists, who generally have limited knowledge of the resource and its scientific value, or by commercial collectors who treat fossils as marketable commodities to be exploited for economic gain. In Fossil Basin, fossils have been treated as marketable commodities from the late 1800s until today (Grande 1980). There is a high probability that significant fossils would be lost as a result of indirect impacts from the proposed project.

Cumulative Impacts. The paleontological resources of the proposed project area and the surrounding region are exceptionally rich and of substantial scientific significance. These resources would receive adverse impacts as a result of the proposed action and future development in the area. Impacts would primarily be indirect and would occur as a result of the increased population of the region and the improved road access.

Alternatives

Locations where bedrock of the Fossil Butte Member and/or Wasatch Formation may be affected by proposed alternatives are:

- The entire gas gathering line ROW for well 9 (2.4 miles) and MP 3.0-4.6 for well 10
- Sales gas pipeline alternative 2 (MP 3.2-6.0, 8.0-14.7, 15.5-16.0)

Mitigation Alternative of Fencing. Fencing of the proposed eastern access and sulfur haul road would lower the magnitude of indirect impacts by reducing ORV access to sensitive paleontological resources on lands outside the fenced ROW.

Cumulative Impacts. Same as described above for proposed action.

SOILS

Indicators of Impact Significance

Indicators of potential impact significance included the degree and areal extent of disturbances, erosion susceptibility, and reclamation potential of the areas that would be directly affected during construction, operation, and maintenance of the various project components. Impacts to the soils resource were considered significant if there is a high probability that soil erosion would not be held to acceptable levels and disturbed areas would not be able to revegetate. An "acceptable" soil erosion level is defined as the amount of soil loss that would not significantly affect the

long-term productivity and stability of disturbed areas. Findings were based on analyses of soils and terrain traversed and on the general erosion control, restoration, and revegetation measures presented in Chapter 1.

Proposed Action

Construction of the proposed action would disturb approximately 917 acres of soils and topography. Surface facilities (including the proposed eastern access and sulfur haul road) would remove about 314 acres of soils from production over the life of the project. Soil surface disturbance, excavation (cut-and-fill and trenching operations), and removal of vegetative cover would temporarily increase the present soil erosion rates and soil instability. These increases would continue until denuded areas were revegetated.

Plant Site. Depending on the amount of grading and excavation necessary at the plant site, existing soil profiles could be completely altered or destroyed during site preparation. Topsoil (or salvageable soil) removal, stockpiling, and redistribution would result in an intermixing of the native topsoils. Depending on the specific topsoil removal plan chosen (e.g., selective or nonselective, salvage depths), topsoil may be salvaged and mixed with less desirable subsoils or bedrock. Alteration of the existing soil profiles and mixing of topsoil or salvageable soil would alter the physical, chemical, and biological characteristics of the native soils. For example, physical features potentially affected include surface textures, soil structure, permeability, and infiltration rates; chemical features include pH, sodium levels, and macro- and micro-nutrients; biological features include the type and quantity of soil microorganisms.

Reclamation Potential. Assuming a moderately intensive erosion control and reclamation program would be implemented during and following construction (refer

to the general erosion control, restoration, and revegetation measures in Chapter 1), most disturbed areas should recover within 3 to 5 years (i.e., a native grass cover would be reestablished). The soils data in Appendix C indicate that some areas may be difficult to reclaim due to adverse physical and chemical soil properties, such as: absence of and/or restricted topsoil (or salvageable soil) supply, and excess salts and alkalinity. Additionally, the semiarid condition in the project region could inhibit reclamation efforts. Since the applicant has committed to "reclaiming disturbed areas to the satisfaction of the surface management agency or as agreed to with private land owners," no significant impacts to the soils resource would be expected to occur from implementation of the proposed action.

Cumulative Impacts. Implementation of the proposed action would contribute an insignificant amount of additional soil erosion to the overall (present and future) amount of soil erosion occurring in the project region.

Alternatives

Acres of soil surface disturbance that would result from construction of the various alternatives are presented in Table 1-1. Impacts to the soil resource associated with the alternatives are generally similar to those discussed for the proposed action.

Alternative Access and Sulfur Haul Road. Selection of this alternative would reduce soil disturbance during the construction phase by about 494 acres, and would reduce the amount of soils removed from production (over the life of the project) by about 184 acres.

Mitigation Alternative of Fencing. Fencing of the proposed eastern access and sulfur haul road (MP 1.0-21.0) would reduce livestock and wildlife disturbances on reclaimed areas within the fenced ROW, thereby potentially increas-

ing revegetation and reclamation success on these areas. This alternative would also reduce off-road soil disturbances and potential increases in sedimentation and turbidity of receiving streams by controlling ORV access to lands outside the fenced ROW.

Cumulative Impacts. Cumulative impacts to the soil resource resulting from construction and operation of the alternatives would be the same as discussed for the proposed action.

WATER RESOURCES

Indicators of Impact Significance

Indicators of impact significance for water resources include the rules and regulations of the agencies overseeing aspects of the project. An indicator of significance for water quality would be the water quality standards established by the Wyoming DEQ. A significant impact would be indicated if these water quality standards were exceeded. For potential hydrologic impacts, an indicator of significance would correspond to a specific percentage flow reduction in stream or spring flow. This flow reduction could occur as a result of the storage and diversion of surface water or reduced spring outflow resulting from groundwater withdrawal. In addition, a specific drawdown in the piezometric surface of the aquifer providing ground water would be an indicator of significance. The specific numbers corresponding to these indicators of significance would depend on the nature of the stream or aquifer in question.

Proposed Action

In general, no significant water resource impacts are expected to result from the construction, operation, or abandonment of the Road Hollow project. During construction of the project, soil would be disturbed along ROWs for pipelines, roads, and well gathering lines, as well as at the plant site. Some of the material lost from the disturbed

areas would be transported downgradient into streams, causing temporary increases in the suspended solids content and turbidity of receiving streams as well as increases in downstream sedimentation. Because of erosion control and revegetation efforts (see Chapter 1), these increases would be small in magnitude and temporary in nature. A factor reducing downstream effects is the location of most of the disturbed areas along drainage divides, which allows sediment to be trapped between the disturbed area and the drainage channel. Another factor reducing downstream transport is the low rainfall and surface runoff that characterize the area. Somewhat greater effects would result from those pipelines that cross streams, such as the proposed gas gathering lines for wells 9, 10, 11, and 13, which would cross Chicken Creek or Road Hollow Creek.

Construction activities would consume water and may result in spills of fuels, lubricating oils, solvents, and other construction liquids. Approximately 48 acre-feet of water would be required for construction of both modules. Additional water would be consumed during hydrostatic testing of pipelines and other construction uses, such as watering to reduce dust. Most of the water used during construction would be drawn from a well to be completed near the plant site. No information is presently available on the aquifer to be used and its hydraulic properties; therefore the impact of this ground-water withdrawal cannot be evaluated. If surface water is used for construction activities, streamflow in local creeks would not be significantly affected because the applicant has agreed to limit the flow reduction in affected streams so as not to affect downstream users.

Spills of construction-related liquids would degrade both surface- and ground-water quality in the immediate vicinity of the spill. Direct contamination of surface waters would not be expected, because most disturbed ROWs (except for

well gathering lines for wells 9, 10, 11, and 13) do not cross streams. Some contaminated material, though, would reach surface waters through the eventual transport of contaminated material down-slope into drainage channels. Discharge of hydrostatic test water would have little effect on either ground- or surface-water quality, as the applicant has incorporated Wyoming DEQ policy on hydrostatic test water into the Plan of Operations.

Although detailed plans for the storage and disposal of sewage and solid wastes produced during construction activities have not yet been formulated, they would be designed to meet Wyoming DEQ regulations. As such, the water quality impacts resulting from these activities should be minimal.

Potential operation impacts would be associated with such plant site activities as disposal of wastewater and contaminated runoff, disposal of treated sewage and solid waste, consumption of ground and/or surface water for plant requirements, and spills associated with the storage of chemicals used or produced at the plant site. Spills of chemicals being stored on site, such as amine-treating solvent, triethylene glycol, wastewater, lube oil, molten sulfur, and diesel oil, would have little impact on plant-site water quality because of the Spill Prevention Control and Countermeasures plan for this area. The primary water resources effect associated with other project facilities, such as roads and pipelines, would be spills of chemicals used or produced at the plant site.

Wastewater resulting from plant operations and drainage would be disposed of in an injection well. The total volume of this flow is expected to be 6 gpm (or 9.8 ac-ft/yr). The design and operation of this well would meet the requirements of the Minerals Management Service, the Wyoming Oil and Gas Conservation Commission, and the Wyoming DEQ. Based upon these required approvals, the depth at

which disposal would take place, and the very small quantity of wastewater requiring disposal, it is expected that water quality degradation would be limited primarily to formation waters found in the immediate vicinity of the well. However, the specific formation into which these wastewaters would be injected has not been determined, so specific assessment of the mitigation potential of these contaminated waters has not been made.

Solid wastes produced during operation of the facility would be collected and stored in a central facility and transferred by truck to a sanitary landfill or other facility suitable for disposal. As all disposal sites and methods would be approved by the Wyoming DEQ, water quality degradation resulting from such activities would be minimal. Sewage produced at the plant site would be treated in a package treatment plant or a septic tank in accordance with Wyoming DEQ regulations. Consequently, water quality and soil contamination would be limited to the immediate vicinity of the discharge pipe from the package treatment plant or the leach fields from the septic tank.

Annual average water supply requirements for both modules are expected to be 32 acre-feet (20 gpm). As with the construction water supply, this water would be withdrawn from wells. The impact of this ground-water withdrawal cannot be determined until the prospective aquifer and its hydraulic properties are characterized.

A composite index for evaluating the relative water quality (and, in some cases, quantity) impacts of the proposed action involving either disturbance along linear routes or transportation along linear corridors was developed. As explained in Appendix F, the higher values of the index indicate greater potential for water quality degradation. The results of this effort are contained in Table 1-3.

Cumulative Impacts. The cumulative impact of this project on water resources would be small. During construction, small cumulative effects on Little Muddy Creek would be detected to the extent that construction and subsequent revegetation and reclamation activities at the Chevron and Amoco facilities overlap with those activities at the Exxon site. Cumulative impacts during the operation of the plant would be limited to the movement of contaminated sediments into Little Muddy Creek and the Bear River. Potential cumulative effects due to removal of ground water cannot be evaluated until the ground water source is identified.

Alternatives

The impacts associated with alternative project components are expected to be similar to those discussed for the proposed action. Relative water quality impacts for each alternative are shown in Table 1-3. Only those alternatives that would result in a different magnitude or type of impact beyond that described in Table 1-3 are discussed below.

Gas Gathering Pipelines. Water quality indices for individual gathering lines would be different from the proposed action for the following components.

<u>Well Gather- ing Line</u>	<u>Water Quality Index</u>	
	<u>Proposed</u>	<u>Alternative</u>
7	0.041	0.037
8	0.0012	0.0009
9	0.11	0.08
10	0.16	0.19

Water Supply. The delivery of water from Woodruff Narrows via the fully developed Chevron Carter Creek facility would increase annual withdrawal from the Bear River by 32 acre-feet.

Cumulative Impacts. The purchase and delivery of surface water from the Bear River (Woodruff Narrows) would result in

a 3 percent increase over the amount of total annual withdrawal for the Chevron Carter Creek plant.

VEGETATION

Indicators of Impact Significance

Impacts on vegetation caused by any aspect of construction, operation, maintenance, and abandonment of facilities included in the proposed action or alternatives were considered in a detailed analysis if the following indicators were exceeded:

- 1) Reduction of 10 percent of the total area of a major vegetation type in a 10-mile-diameter circle centered on the plant site or within a 2-mile-wide strip centered on each linear facility.
- 2) Reduction of 5 percent of the total area of an important (rare, sensitive, difficult to reclaim, or productive) vegetation type in the areas described under 1) above.

Following this initial step, all identified impacts were evaluated in more detail to determine significance.

Vegetation types characteristic of disturbed areas were not included in the analysis. Separate impact analyses were completed for all proposed and alternative facilities; individual gas gathering lines were combined into a gas gathering system and evaluated as a unit.

Proposed Action

Construction. Areas of each major vegetation type that would be disturbed (cleared) by construction of each facility in the proposed action are indicated in Table 3-4. No significant impacts would result from construction of any facility. The area of each type that would be disturbed is low (maximum 1.6 percent) compared with the total area of the type in the geographic area of influence.

The vegetation of temporarily disturbed areas (areas not covered by facil-

ities) would be changed from existing vegetation to a revegetated type dominated by planted perennial grasses and forbs. The time required for establishment of vegetation similar to preexisting vegetation in these areas would vary by vegetation type. Estimates of time periods for recovery are 15-30 years for sagebrush shrubland and sagebrush-serviceberry shrubland (Fisser 1980; Frischknecht 1968; Tisdale and Hironaka 1981), 10-15 years for perennial mat forb grass (Costello 1974), 20-40 years for aspen forest, 100-150 years for juniper woodland-sagebrush shrubland (Wight and Fisser 1968), and 2-5 years for wet meadow (Hansen 1977). Localized revegetation problems may occur on areas with thin and rocky soils (ridgetop grass-forb vegetation type), dry soils, and saline-alkaline soils.

Operation, Maintenance, and Abandonment. Operation, maintenance, and abandonment of facilities in the proposed action are expected to result in no significant impacts on vegetation. Potential accidental releases of hydrogen sulfide gas, sales gas, condensate, NGL, or sulfur could have locally important adverse impacts on affected vegetation. Releases of gaseous effluents from plant sources are expected to result in no significant impacts on vegetation.

Cumulative Impacts. Construction, operation, maintenance, and abandonment of facilities included in the proposed action are expected to result in no significant cumulative impacts on vegetation.

Threatened and Endangered Species. Construction, operation, maintenance, and abandonment of proposed and alternative facilities are expected to result in no significant adverse impacts to Physaria condensata (Dense twinpod).

Alternatives

Areas of each major vegetation type that would be disturbed (cleared) by construction of each facility in alternative actions are indicated in Table 3-4.

Table 3-4. AREAS OF MAJOR VEGETATION TYPES THAT WOULD BE DISTURBED
DURING CONSTRUCTION OF PROPOSED AND ALTERNATIVE FACILITIES

Facility	Vegetation (Habitat) Type	Area in Geographic Area of Influence (sq mi)	Area Disturbed by Construction (sq mi)	Percent of Type Disturbed by Construction	Signif- icance ^a
<u>Proposed Action</u>					
Plant Site	Sagebrush Shrubland	51.1	0.063	0.12	NS
Gas Gathering System	Sagebrush Shrubland	16	0.076	0.48	NS
	Aspen Forest	1.2	0.006	0.50	NS
	Sagebrush-Serviceberry Shrubland	4.4	0.021	0.48	NS
	Perennial Mat Forb-Grass	0.4	0.002	0.50	NS
Sales Gas Pipeline	Sagebrush Shrubland	12.4	0.024	0.19	NS
	Perennial Mat Forb-Grass	2.8	0.005	0.18	NS
	Aspen Forest	0.4	0.001	0.25	NS
NGL and Condensate Pipelines	Sagebrush Shrubland	27.2	0.103	0.39	NS
	Sagebrush-Serviceberry Shrubland	7.8	0.030	0.38	NS
	Perennial Mat Forb-Grass	4	0.015	0.38	NS
	Aspen Forest	2.6	0.010	0.38	NS
	Juniper Woodland-Sagebrush Shrubland	0.2	+	+	NS
<u>Processing and Disposal of H₂S</u>					
Sulfur Haul Road	Perennial Mat Forb-Grass	21.6	0.348	1.61	NS
	Sagebrush Shrubland	19.8	0.319	1.61	NS
	Sagebrush-Serviceberry Shrubland	3.2	0.052	1.63	NS
	Wet Meadow	0.4	0.006	1.5	NS
Electric Power Transmission Line	Perennial Mat Forb-Grass	0.2	+	+	NS
	Aspen Forest	0.2	+	+	NS
<u>Access Road</u>					
Permanent: Eastern Access Road ^b					

Table 3-4. AREAS OF MAJOR VEGETATION TYPES THAT WOULD BE DISTURBED
DURING CONSTRUCTION OF PROPOSED AND ALTERNATIVE FACILITIES (concluded)

Facility	Vegetation (Habitat) Type	Area in Geographic Area of Influence (sq mi)	Area Disturbed by Construction (sq mi)	Percent of Type Disturbed by Construction	Signif- icance ^a
<u>Alternatives</u>					
Gas Gathering System	Sagebrush Shrubland	11.8	0.050	0.42	NS
	Perennial Mat Forb-Grass	5	0.021	0.42	NS
	Aspen Forest	1.8	0.008	0.44	NS
	Sagebrush-Serviceberry Shrubland	0.2	0.001	0.50	NS
Sales Gas Pipeline Alternative 1	Sagebrush Shrubland	22	0.042	0.19	NS
	Sagebrush-Serviceberry Shrubland	7.6	0.014	0.18	NS
	Perennial Mat Forb-Grass	4	0.008	0.20	NS
	Aspen Forest	1.4	0.003	0.21	NS
	Alternative 2				
	Sagebrush Shrubland	15.2	0.029	0.19	NS
	Perennial Mat Forb-Grass	15	0.028	0.19	NS
	Sagebrush-Serviceberry Shrubland	4.8	0.029	0.19	NS
NGL and Condensate Pipelines Alternative 1	Sagebrush Shrubland	41	0.155	0.38	NS
	Sagebrush-Serviceberry Shrubland	17.2	0.065	0.38	NS
	Perennial Mat Forb-Grass	4	0.015	0.38	NS
	Aspen Forest	4	0.015	0.38	NS
	Juniper Woodland-Sagebrush Shrubland	1.2	0.005	0.42	NS
	Wet Meadow	0.2	0.001	0.50	NS
	Electric Power				
	Transmission Line				
	Sagebrush Shrubland	10.6	0.020	0.19	NS
	Perennial Mat Forb-Grass	2.8	0.005	0.18	NS
	Aspen Forest	0.4	0.001	0.25	NS
Sulfur Haul/Access Road	Sagebrush Shrubland	10.6	0.100	.94	NS
	Perennial Mat Forb-Grass	2.8	0.025	.89	NS
	Aspen Forest	0.4	0.005	1.25	NS
Water Supply Alternative 1	(Same as for proposed sales gas pipeline)				

^aNS = not significant.

^bIncluded under proposed sulfur haul road.

Construction, Operation, Maintenance, and Abandonment. Construction, operation, maintenance, and abandonment of facilities included in alternative actions are expected to result in no significant impacts on vegetation. The area of each vegetation type that would be disturbed by construction/clearing activities is very low (maximum 1.25 percent) compared with the total area of the type in the geographic area of influence.

Time periods required for establishment of similar vegetation in temporarily disturbed areas are the same as described for the proposed action. Comments made with regard to potential impacts of operation, maintenance, and abandonment of facilities in the proposed action also apply to facilities in alternative actions.

Cumulative Impacts. Construction, operation, maintenance, and abandonment of facilities included in alternative actions are expected to result in no significant cumulative impacts on vegetation.

WILDLIFE

Indicators of Impact Significance

The wildlife impact assessment was primarily based on the following indicators of impact significance:

- Reduction of 10 percent of the total area of 1) important wildlife (big-game) habitats in the geographic area of influence, including mule deer, elk, moose, and pronghorn crucial winter range, or 2) fawning or calving habitats, i.e., aspen forest, and sagebrush-serviceberry shrubland
- Any reduction in the area of a sage grouse strutting ground
- Reduction of 5 percent of the area of a sage grouse nesting concentration area (the area located within 2 miles of the center of a strutting ground)

Other impacts were qualitatively evaluated, including roadkill mortality,

mortality due to increased levels of legal and illegal hunting, mortality due to accidental releases of H₂S or other toxic substances, reduced reproductive success due to disturbance from human presence and activity, mortality due to destruction of nests with eggs or young, and mortality due to temporary or permanent abandonment of eggs or young resulting from disturbance.

Cumulative impacts were evaluated by considering the impacts of the project in combination with additive and interactive impacts of other projects (described in Chapter 1 and Appendix A), and activities that would occur in the geographic area of influence of the proposed Road Hollow project. Cumulative impact significance was determined by comparing the magnitude of combined impacts with indicators of impact significance established for this project.

Proposed Action

Construction. Clearing of areas for construction of facilities included in the proposed action would result in no significant losses of important wildlife habitats. No areas of mule deer, elk, moose, or pronghorn crucial winter range would be disturbed. In addition, only relatively small areas of available aspen forest and sagebrush-serviceberry shrubland habitats--i.e., potential fawning and calving areas--would be disturbed by construction of each facility (maximum 1.6 percent) compared with the total areas of these habitat types in the geographic area of influence (Wildlife Technical Report). No known raptor nest sites, sage grouse strutting grounds, or sage grouse nesting concentration areas would be cleared for construction of facilities.

Utilization of the existing Spring Creek access road in the first year of construction in the winter would disturb wintering mule deer present in the area of crucial winter range located between MP 6.7 and 19. Potential disturbance would result from the presence of humans,

including vehicles. Disturbance could result in the avoidance of areas located directly adjacent to the road (within approximately 1 mile), and crowding and subsequent overutilization of occupied areas. Crowding and overutilization in occupied areas could result in winter mortality due to starvation and reduced reproductive success in the spring due to malnutrition and physiological stress.

Human presence and activity would not significantly disturb sage grouse courtship or nesting activities on and adjacent to strutting grounds, nesting golden eagles, and nesting prairie falcons due to the imposition of construction avoidance dates and other provisions in the standard BLM Wyoming state ROW grant stipulations.

The transportation of construction workers associated with the project would result in increased road-kill mortality on paved and unpaved access roads, and legal and illegal hunting. Existing levels of these conditions are not precisely known, and predictions of future levels could not be developed with available data. Accidental releases of H₂S or other toxic substances from damaged structures could result in wildlife mortality in localized areas. The potential magnitude of this type of impact is not known.

Operation, Maintenance, and Abandonment. Operation, maintenance, and abandonment of facilities in the proposed action would require the presence of a relatively small work force. Impacts resulting from human presence and activity of the type discussed above could occur at reduced levels.

Cumulative Impacts. No significant adverse cumulative impacts would result from habitat loss associated with construction of proposed facilities. Cumulative disturbance resulting from human presence and activity associated with construction, operation, maintenance, and abandonment of proposed Road Hollow proj-

ect facilities and other projects may result in increased magnitudes of impacts of the type described above, especially overcrowding of wintering mule deer in the area of crucial winter range located between MP 6.7 and MP 19 on the Spring Creek access road. Increased disturbance of nesting sage grouse and raptors may also occur.

Threatened and Endangered Species. Construction, operation, maintenance, and abandonment of facilities in the proposed action would have no significant adverse impacts on the black-footed ferret, bald eagle, whooping crane, or American peregrine falcon.

Alternatives

Construction. Clearing of areas for construction of facilities included in alternative actions would result in no significant losses of important wildlife habitats. Construction of the alternative condensate-NGL pipeline to Divide Junction would result in clearing of 0.020 square miles (MP 29-31.7), or about 0.38 percent of the total area of mule deer crucial winter range in the area of influence. Construction of the alternative sales gas pipeline to the Kemmerer compressor station would result in clearing of 0.002 square miles (MP 17-17.5), or about 0.20 percent of the total area of mule deer crucial winter range in the area of influence. In addition, small areas of available aspen forest and sagebrush-serviceberry shrubland habitats (potential fawning and calving areas) would be cleared by construction of each facility (maximum 0.50 percent) compared with the total areas of these habitat types in the geographic area of influence (Wildlife Technical Report). No known raptor nest sites, sage grouse strutting grounds, or significant portions of sage grouse nesting concentration areas would be cleared for construction of alternative facilities.

Additional types of general impacts described for the proposed action also apply to alternatives.

Operation, Maintenance, and Abandonment. General impacts described for the proposed action also apply to alternatives.

Mitigation Alternative of Fencing. Implementation of the mitigation alternative of constructing a livestock fence along the permanent eastern access road would probably not prevent movements of mule deer, pronghorn, and elk. Depending on the height of the fencing, limited mortality of mule deer may occur from animals being caught on the upper portion of the fence while jumping when deep snow is present (Papez 1976).

Cumulative Impacts. No significant adverse cumulative impacts would result from habitat loss associated with construction of facilities included in alternative actions. Cumulative disturbance resulting from human presence and activity associated with construction, operation, maintenance, and abandonment of alternative Road Hollow project facilities and other projects would result in impacts similar in magnitude to those discussed for the proposed action.

AQUATIC ECOLOGY

Indicators of Impact Significance

No indicators of impact significance were established for the aquatic ecology impact analysis because of the lack of important aquatic resources (especially fish) in the geographic area of influence.

Proposed Action

Construction. Construction of the plant and gas gathering system may result in short-term stream sedimentation and increased water turbidity in upstream portions of Road Hollow Creek and Chicken Creek, depending on flow conditions during the construction period. Both of these streams are intermittent and support no fish populations. It is considered unlikely that substantial amounts of sediment would be transported to Muddy

Creek and Black's Fork, which are perennial and support important game and non-game fish populations. Applicant-committed practices would generally reduce the magnitude of potential stream sedimentation and turbidity impacts.

Operation, Maintenance, and Abandonment. Operation, maintenance, and abandonment of facilities included in the proposed action are expected to result in no significant impacts on aquatic biota.

Cumulative Impacts. Construction, operation, maintenance, and abandonment of facilities included in the proposed action are expected to result in no significant cumulative adverse impacts on aquatic biota.

Important Species. Construction, operation, maintenance, and abandonment of proposed and alternative facilities are expected to result in no significant adverse impacts of any type on important fish species, including the Colorado cutthroat trout and Bonneville cutthroat trout.

Alternatives

Construction. Construction of the alternative gas gathering system across Chicken Creek, the alternative 2 sales gas pipeline across Twin Creek, and the alternative condensate-NGL pipeline across Shurtleff Creek and Clear Creek may result in some short-term stream sedimentation and increased turbidity, depending on flow conditions in the construction period. No significant adverse impacts of any type on fish populations in the Bear River (downstream of Twin Creek) and in Muddy Creek - Black's Fork (downstream of Shurtleff Creek and Clear Creek) are expected. Applicant-committed practices would generally reduce the magnitude of potential stream sedimentation and turbidity impacts.

Operation, Maintenance, and Abandonment. Operation, maintenance, and abandonment of facilities included in alternative actions are expected to result in

no significant impacts on aquatic biota. Potential accidental releases of condensate, NGL, or H₂S could have locally important, short-term adverse impacts on aquatic biota, depending on the location, time, and volume of the release.

Cumulative Impacts. Construction, operation, maintenance, and abandonment of facilities included in alternative actions are expected to result in no significant cumulative adverse impacts on aquatic biota.

LIVESTOCK AND RANGE

Indicators of Impact Significance

Impacts to livestock and range were considered potentially significant if any of the following conditions were met:

- Construction and operation of the proposed action or alternatives would remove 1 percent (or more) of the available AUMs within a grazing allotment on a long-term basis (i.e., for longer than 5 years).
- Construction and operation of the proposed action or alternatives would impede livestock movements to the point where the indicator of 1 percent listed above would be exceeded, due to a large area becoming inaccessible to livestock.
- Construction of the proposed action or alternatives would severely disrupt lambing operations between May 1 and June 10.
- Construction and operation of the proposed action and/or alternatives, when considered together with the proposed projects listed in Appendix A (i.e., cumulative impacts), would remove 5 percent (or more) of the available AUMs within a grazing allotment on a long-term basis (i.e., for longer than 5 years).

Proposed Action

Construction of the proposed action would result in a short-term (e.g., estimated 3 to 5 years required for restoration of vegetation and AUMs) loss of

about 101 AUMs for cattle or 111 AUMs for sheep. These short-term AUM losses correspond to 0.15 percent and 0.17 percent, respectively, of the estimated 66,000 AUMs available within the Cumberland/Uinta grazing allotment (refer to Table 3-5). This potential impact is not considered significant.

Long-term (e.g., over the life of the project) AUM losses potentially attributable to the proposed action are about 32 AUMs per year for cattle or 36 AUMs per year for sheep (refer to Table 3-5). These long-term AUM losses would represent about 0.05 percent of the estimated total AUMs available within the Cumberland/Uinta allotment, and are not considered significant.

Construction and upgrading of the end of the proposed eastern access/sulfur haul road near Highway 189 has the potential to disrupt lambing operations in this area. Limiting construction activities in this area between May 1 and June 10 would help minimize impacts to lambing operations. Disruptions to lambing operations in this particular area have occurred and are presently occurring; thus potential disruptions attributable to road construction in this area would not be considered severe.

An unquantifiable number of livestock losses would occur along access and haul roads associated with the proposed action. This impact could be reduced through reimbursement of operators for lost cattle and sheep by the applicant. No significant obstructions to livestock movements would result from the proposed action.

Cumulative Impacts. The proposed projects considered in the cumulative analysis are presented and discussed in Appendix A. These projects, if built, would remove approximately 1327 AUMs from production in the long term. This corresponds to about 2.01 percent of the total AUMs available within the Cumberland/Uinta grazing allotment. The proposed

Table 3-5. ESTIMATED AUM LOSSES ATTRIBUTABLE TO PROPOSED ACTION IN CUMBERLAND/UINTA GRAZING ALLOTMENT^a

Estimated Short-Term AUM Loss Per Year (cattle/sheep) ^{b,c}	Short-Term Percentage of Estimated Total AUMs Within Allotment (cattle/sheep) ^d	Estimated Long-Term AUM Loss Per Year (cattle/sheep) ^{c,e}	Long-Term Percentage of Estimated Total AUMs Within Allotment (cattle/sheep) ^d
<u>Plant Site</u>			
7.4/8.2	0.01/0.01	7.4/8.2	0.01/0.01
<u>Gas Gathering Pipelines for Wells 4, 7, 8, 9, 10, 11, 12, and 13</u>			
8.0/9.5	0.01/0.01	NA	NA
<u>Sales Gas Pipeline to Carter Creek</u>			
3.2/3.6	0.01/0.01	NA	NA
<u>NGL and Condensate Pipelines to Ryckman Creek</u>			
17.7/17.8	0.02/0.02	NA	NA
<u>Transmission Line</u>			
0.1/0.1	<0.01/<0.01	<0.1/<0.1	<0.01/<0.01
<u>Eastern Access and Sulfur Haul Road</u>			
64.6/72.0	0.09/0.10	24.5/27.5	0.04/0.04
<u>Proposed Action Totals</u>			
101.0/111.2	0.15/0.17	32.0/35.9	0.05/0.05

NA = Not Applicable.

^aAUM losses based on new disturbance/forage production losses (only).

^bFor this analysis, short-term is defined as 3 to 5 years (i.e., time required for restoration of vegetation/AUMs).

^cSource: BLM 1964.

^dBased on estimated 66,000 total AUMs within Cumberland/Uinta grazing allotment.

^eFor this analysis, long-term is defined as greater than 5 years (i.e., over life of project).

action for the Road Hollow project, when considered together with these other projects, would increase the percentage of AUMs removed to about 2.06 percent.

Alternatives

Short-term AUM losses associated with each applicable alternative are presented in Table 3-6. The percentages of total available AUMs within each applicable grazing allotment that would be taken out of production (by each alternative) are also listed in Table 3-6.

Impacts to livestock grazing and lambing areas for the alternatives are generally similar to those discussed for the proposed action. No significant impacts were identified for any of the alternatives.

Alternative Sulfur Haul and Access Road. The alternative sulfur haul and access road (that uses Amoco's existing sulfur haul road and Dee Ranch Road) would remove about 11 AUMs per year for cattle or about 12 AUMs per year for sheep because of upgrading and widening of the existing Bear River Divide Road from milepost 0 to 7.4. Selection of this alternative over the proposed eastern access/sulfur haul road would potentially reduce long-term AUM losses for cattle or sheep by 13.6 and 15.6 AUMs per year, respectively. Selection of this alternative would reduce potential disruptions of lambing areas associated with the proposed eastern access/sulfur haul road.

Mitigation Alternative of Fencing. This alternative, if implemented, would require fencing of the proposed eastern access and sulfur haul road between MP 1.0 and 21.0 (refer to Map G-1). The BLM would require the applicant to install livestock gates at selected locations along the fence.

Beneficial impacts to livestock grazing and the range resource that would result from implementation of this alternative include: reduction in livestock

losses (i.e., road kills) on the road, elimination of indirect off-road impacts to the range resource from increased ORV access, and decreased off-road harassment of livestock and lambing operations. In addition, fencing of the proposed eastern access and sulfur haul road would allow the BLM to have more control of livestock movements within the Cumberland/Uinta grazing allotment.

Adverse impacts to livestock operators associated with this alternative include: restrictions to day-to-day livestock movements within the northern portion of the Cumberland/Uinta grazing allotment, and prevention of forage utilization by livestock within the 100-foot-wide fenced area from MP 1.0-21.0. Seasonal livestock movements would not be significantly affected as long as gates were installed at appropriate locations.

Cumulative Impacts. The cumulative impacts to livestock grazing from the alternatives, when considered together with the other proposed projects in the region (refer to Appendix A), would be essentially the same as discussed for the proposed action.

CULTURAL RESOURCES

Indicators of Impact Significance

Potential impacts were assessed for significance in terms of applicant-committed mitigation measures and agency compliance procedures using the following indicators of significance.

Indicators for evaluating cultural resource significance are those set forth to determine the eligibility of resources for listing in the National Register of Historic Places (36 CFR 60.6 [41 FR 1595]):

The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of

Table 3-6. ESTIMATED AUM LOSSES ASSOCIATED WITH ALTERNATIVES^a

Potentially Affected Grazing Allotment	Estimated Short-Term AUM Loss Per Year (cattle/sheep) ^{b,c}	Percentage of Estimated Total AUMs Within Allotment (cattle/sheep) ^d
<u>Alternative Gas Gathering Pipelines for Wells 7, 8, 9, and 10</u>		
Cumberland/Uinta	6.6/7.6	0.01/0.01
<u>Alternative Sales Gas Pipeline to Whitney Canyon</u>		
Cumberland/Uinta	7.8/7.8	0.01/0.01
<u>Alternative Sales Gas Pipeline to Northwest-Kemmerer Compressor Station</u>		
Cumberland/Uinta	6.2/7.0	0.01/0.01
<u>Alternative Condensate/NGL Pipelines to Divide Junction</u>		
Cumberland/Uinta	19.5/19.9	0.03/0.03
Rock House	2.3/2.3 ^e	0.14/0.14
Byrne Creek	0.5/0.5 ^e	0.18/0.18
Heinsaw Creek	2.5/2.5 ^e	0.22/0.22
Myers	0.9/0.9 ^e	0.10/0.10
<u>Alternative Water Pipeline from Carter Creek</u>		
Cumberland/Uinta	3.2/3.6	0.01/0.01
<u>Alternative Transmission Line from Carter Creek</u>		
Cumberland/Uinta	3.1/3.4	0.01/0.01
<u>Alternative Access/Sulfur Haul Road</u>		
Cumberland/Uinta	10.9 ^f /11.9 ^f	0.02/0.02

^a AUMs based on new disturbance/forage production losses (only).

^b For this analysis, short-term is defined as 3 to 5 years (i.e., time required for restoration of vegetation/AUMs).

^c Sources: BLM 1964. (Cumberland/Uinta allotment). BLM undated. (All other allotments).

^d Based on the following total AUM estimates within allotments: Cumberland/Uinta = 66,000; Rock House = 1670; Byrne Creek = 284; Heinsaw Creek = 1114; and Myers = 904.

^e AUM data not available for sheep in these areas--assumed same as for cattle.

^f AUM losses would occur over life of project (i.e., long-term as defined for this analysis).

location, design, setting, materials, workmanship, feeling, and association, and

- (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
- (b) That are associated with the lives of persons significant in our past; or
- (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (d) That have yielded, or may be likely to yield, information important in prehistory or history.

Unless a property is of exceptional importance, sites younger than 50 years are not considered eligible for the National Register.

The indicators for determining the effect of construction on cultural resources are set forth in 36 CFR 800.3. An effect occurs when an undertaking changes the integrity of location, design, setting, materials, workmanship, feeling, or association of the property, those attributes that contribute to its significance in accordance with National Register criteria. Criteria for judging an effect to be adverse include:

- Destruction or alteration of all or part of a property
- Isolation from or alteration of the property's surrounding environment
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting
- Neglect of a property resulting in its deterioration or destruction
- Transfer or sale of a property without adequate conditions or restrictions regarding preservation, maintenance, or use.

Impacts are considered significant if there is a reasonable probability that a resource eligible for the National Register could be damaged or destroyed as a result of the proposed action or alternatives and if provisions will not be made to mitigate those adverse effects. The completion of adequate mitigation measures (designed with concurrence of the BLM and the Wyoming State Historic Preservation Officer) would result in a "no adverse effect" (36 CFR 800.4) determination even if the action involved significant cultural resources.

Proposed Action

Direct Impacts. As detailed in Chapter 1, a cultural resource management plan would be developed by the applicant, in consultation with the BLM and State Historic Preservation Officer based on the Class I and Class III cultural resources inventories. The management plan will outline procedures and methods to identify, evaluate, and protect (i.e., through avoidance or scientific data recovery) significant cultural resources. All known cultural resources that are listed in or determined eligible for inclusion in the National Register would be avoided where practical. Impacts to resources that are not prudently or feasibly avoidable would be mitigated according to the procedures and methods of the management plan. Therefore no known cultural resources should be adversely affected by the proposed action (as per 36 CFR 800.4).

Indirect Impacts. Indirect adverse impacts could occur as a result of the proposed action. These indirect effects include:

- Increased numbers of off-road vehicles (ORVs) related to regional growth in population and personal income, resulting in a possible increase of uncontrolled collection or vandalism of the cultural resources.
- Increased inadvertent destruction of resources due to erosion, exacerbated by ORVs as well as by development and landscape modifications.

Cumulative Impacts. Cumulative impacts resulting from the incremental effect of the proposed action when added to other past, present, and reasonably foreseeable future projects or actions occurring within the geographic area of influence for indirect impacts include:

- Increased public awareness of the resource base through public documents, public information on deliberate conservation or mitigation programs, and collection of artifacts by amateurs and souvenir hunters
- Increased access to resource areas through the construction of roads

Alternative Actions

Direct Impacts. No known cultural resources would be adversely affected by the alternative actions, for the reasons given above for the proposed action.

Indirect Impacts. Indirect impacts that could occur as a result of the alternative actions are the same as those discussed above for the proposed action.

Cumulative Impacts. Cumulative impacts that could occur from the incremental effect of the alternative actions when added to past, present, and reasonably foreseeable future projects or actions are the same as those discussed above for the proposed action.

VISUAL RESOURCES

Indicators of Impact Significance

Significant visual consequences are defined as project-induced landscape modifications that exceed the limits established by BLM for the landscape Visual Resource Management (VRM) class. The total numerical contrast rating for features within the VRM Class IV study area should not exceed 20.

Proposed Action

Contrast rating forms are included in Appendix D, detailing the nature and extent of landscape modification for each of the proposed actions and alternatives.

Short-term impacts would result from clearing and grading of the plant site and pipeline ROWs, leaving noticeable, but not significant, visual contrasts until reclamation takes effect. For the most part, these temporary disturbances to landscape character are located in areas away from primary public use, such as major roadways and recreation sites, and thus have low sensitivity.

Visual contrasts in color, texture, and line would result from road and pipeline construction where proposed ROWs cross corridors identified as the Oregon Trail. These contrasts would be particularly sensitive in locations where the trail ruts are clearly visible and interpretive markers have been placed for public reference.

Cumulative Impacts. Additive visual impacts would result from the unnatural features of the plant as seen in combination with the other two plants along ridge lines in the study area. The addition of this facility would not constitute a change in character from what is now seen, however.

TRANSPORTATION

The objective of the transportation assessment is to identify where demands on the system resulting from either the movement of goods or personnel associated with project actions or alternatives would stress existing capacities, surface tolerances, or maintenance programs.

Indicators of Impact Significance

The following indicators were used to determine where transportation impacts could be significant:

- An increase in average hourly traffic excess of the 1400-vehicles-per-hour critical threshold established for two-lane paved roadways
- An increase in the type or volume of use that exceeds the engineered thresholds for surface capacity or wear.

Proposed Action

Estimates of employee commute patterns and volume were based on assumptions made for the socioeconomic analysis. Information regarding the method and schedule for movement of construction equipment and bulk goods came from the project description.

Temporary construction access via U.S. 30N and Spring Creek Road would not directly affect any transportation resources. Commute traffic associated with peak employment periods (256 in the summer of 1984) traveling to the plant site from Kemmerer and Diamondville would increase average daily traffic on U.S. 30N and the Spring Creek (Red Eye) Road by approximately 125 vehicles (assuming an average vehicle use by two persons). U.S. 30N would not be significantly affected by this increase. Impacts already identified for the Spring Creek (Red Eye) Road would increase in magnitude as a result of increased use from this project. Specifically, disruption to the big-game wintering habitat identified by the state Game and Fish Department would intensify. Road kills are also likely to increase as traffic volume increases. The need for surface maintenance, particularly during inclement weather, would increase with traffic use.

The proposed eastern access road would not have an impact on transportation resources. Improved access would affect recreation resources by increasing access to hunting areas and could result in cultural and visual impacts to Oregon Trail variants.

Alternatives

Use of the existing Amoco sulfur haul road for access and as a sulfur haul road would eliminate the need for construction of a new roadway. It would also result in a longer commute distance for employees who may choose to reside in Kemmerer and would make Evanston a reasonable alternative for the housing of workers and operations staff. As a result, it is anticipated that traffic (workers and

transport of material) would increase on: 1) the Whitney Canyon Road between Highway 89 and the proposed plant site, and 2) on the existing Amoco sulfur haul road between Highway 189 and the proposed plant site. Based on the indicators of significance, the number of vehicles associated with peak construction and transportation of sulfur would not result in significant impacts to either Whitney Canyon Road or the existing sulfur haul road.

The alternative of transporting ATS instead of elemental sulfur would result in temporary heavy use periods during spring and fall when approximately 250 trucks would be needed to transport product from a storage area near the existing sulfur loadout facility to local customers. This level of traffic would result in short-term impacts of a higher magnitude than for the proposed action but would not exceed the indicators of significance listed above.

Cumulative Transportation Impacts

Increases in average daily traffic would result from the work force and movement of goods associated with the Road Hollow project, in combination with other projects in the study area, along roads used in common between communities of residence and proposed project sites. No significant impacts would result from the additive effects of the combined projects to transportation resources.

RECREATION RESOURCES

The assessment of recreation impacts includes all three phases (construction, operation, and abandonment) of development for each of the separate components of the Road Hollow project: the gas treatment plant, sales gas pipeline, condensate and NGL alternatives, processing and disposal of H₂S, water supply wells, access roads, and transmission lines.

Indicators of Impact Significance

Factors considered in the determination of significance include the direct

and indirect effects on the recreation resources (use of land, disturbance to vegetation, habitat, or outstanding scenic characteristics); and changes in the quality of the recreation experience (such as from increased noise, reduced visibility; and from increased activity demand and subsequent overcrowding of facilities). Recreation impacts are described according to the nature of the impact, the magnitude of change, and duration of change. Short-term consequences, lasting less than two visitor seasons, are considered insignificant.

Proposed Action

None of the recreation resources in the study region would be significantly affected by the construction or operation of the proposed gas treatment plant and ancillary facilities. Noise, dust, and scenic consequences during the construction phase of the gas treatment plant and proposed haul road would occur along segments where the eastern access road and the Oregon National Historic Trail are parallel. Impacts to the natural historic trail experience would be mitigated through applicant-committed practices described in Chapter 1, including: 1) the inclusion of a visitor turnout along the eastern access road, complete with an interpretive display identifying and describing the trail history; 2) avoidance of trail crossing where ruts are visible; and 3) earthen berms (banking of soil along edge of road, seeded for revegetation) along the northern side of the road to mask human modifications from the view of trail users. As indicated in the Wildlife section of this report, wintering areas for big game along the Spring Creek Road portion of the study area would be affected by both construction activities (noise) and increased vehicle traffic in proximity to the game areas. The potential for road kills would also increase.

Poaching would increase as exposure and access to the game area increase as a result of workers' commute patterns. As a result of poaching, both the big-game

hunting success ratio and the hunting experience could be affected. Problems associated with unauthorized use of public lands for overnight camping may result. Impacts such as increased use of sanitary facilities, water use, soil and vegetation loss from compaction, and risk of fire are examples of problems stemming from unauthorized overnight use. BLM land and the campgrounds (Fontenelle Reservoir and Big Sandy Reservoir) would be most affected during peak construction periods. Local fishing spots (Viva Naughton Reservoir, Kemmerer Reservoir, and Hams Fork River) may also experience heavy use during the peak spring and summer construction periods. It is anticipated that the peak construction period would be in the summer of 1984, with a maximum work force of 283 (total direct and indirect construction and operation).

An increase in population would result in increased ORV use in the area. ORV use along unimproved roads and trails would result in impacts to soils, vegetation, and visual resources, and could damage cultural resources such as historic trails.

Cumulative Impacts. Given the total number of recreation resources available within travel distance of the local areas of residence (Kemmerer and Diamondville), minimal impacts are anticipated from the increased demand placed on resources by combined project work forces. Temporary disruptions could affect the quality of the recreation resource and the quality of the recreation experience during peak periods of employment; however, these are not considered significant or unmanageable.

Alternatives

In general, impacts would be similar to those described for the proposed action.

Mitigation Alternative of Fencing.

Fencing of the proposed eastern access road would control ORV access to lands

outside the fenced ROW and thus reduce impacts to unimproved roads, trails, and other recreation resources that are valued because of their undisturbed nature.

SOCIOECONOMIC CONDITIONS

Indicators of Impact Significance

Project-related impacts associated with the Road Hollow project were considered significant in the socioeconomic analysis if they would result in the following changes:

- Population change in existing towns exceeding 10 percent
- Ten percent increase in county, school district, or town net revenues
- Inability of public-sector jurisdictions to meet costs of providing necessary services and facilities to new population prior to receipt of project-related revenues
- Demand for community services and facilities (housing, municipal services, education, social services, health services, law enforcement, fire protection, and recreation) in excess of projected availability
- Inability of the local private sector to respond to new demands for services and facilities not supplied by the public sector

Proposed Action

Economy and Employment. Table 3-7 illustrates the total number of direct and indirect jobs resulting from the Road Hollow project. As shown, total jobs are estimated to peak at 283 in the third quarter of 1984 (during construction of the first module). A second, smaller peak is estimated to occur in mid-1986 during construction of the second module. The total number of direct and indirect operation-period jobs would be approximately 80.

While the expenditures associated with the Road Hollow project would be large (total construction costs are estimated

at \$67.5 million; total wages and salaries during peak construction are estimated at approximately \$11.5 million), the project-related employment and income effects on Kemmerer and Diamondville would not be significant. First, the type and amount of equipment and materials likely to be purchased locally would be limited. Second, the majority of the construction-worker expenditures would be for lodging, food, beverages, and gasoline. While suppliers of these goods and services would realize additional income, it is unlikely that the increased sales due to the Road Hollow project would be translated into a significant number of expansions and/or additions of workers.

Similarly, while the permanent workers associated with the operation of the project would spend a larger percentage of their income in Kemmerer and Diamondville, the number of induced indirect jobs and the amount of the associated indirect income would be insignificant when compared with the total jobs and income locally for the project as a whole.

Population. The estimated population in-migration to Kemmerer and Diamondville due to the proposed action is shown in Table 3-8. The total population increase is estimated to peak at approximately 518 in the third quarter of 1984. Of those, almost 70 percent would be construction workers and associated family members residing in Kemmerer and Diamondville on a temporary basis.

Table 3-9 compares project-related population with the projected population for the Kemmerer-Diamondville area. As shown, the combined construction and operation population increases would account for less than 10 percent of the total projected baseline increase throughout the study period.

Housing. Table 3-10 illustrates the estimated housing demand due to the proposed Road Hollow project. As shown, the majority of workers would seek temporary

Table 3-7. TOTAL PROJECT-RELATED JOBS BY QUARTER, KEMMERER AND DIAMONDVILLE: 1983-1986

Type of Job	1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Construction:																
Direct	--	--	135	155	155	210	225	100	40	40	90	140	145	150	150	100
Indirect ^a	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	--	--	135	155	155	210	225	100	40	40	90	140	145	150	150	100
Operation:																
Direct	--	--	--	--	16	27	31	26	26	26	26	26	26	44	44	39
Indirect ^b	--	--	--	--	16	27 ^c	27 ^c	27	27	27	27	27	27	40 ^d	40 ^d	40
Total	--	--	--	--	32	54	58	53	53	53	53	53	53	84	84	79
Total:																
Direct	--	--	135	155	171	237	256	126	66	66	116	166	171	194	194	139
Indirect	--	--	0	0	16	27	27	27	27	27	27	27	27	40	40	40
TOTAL	--	--	135	155	187	264	283	153	93	93	143	193	198	234	234	179

Source: Woodward-Clyde Consultants 1982.

^aThe number of project-related jobs was estimated at zero during the construction period because of the limited amount of project-related purchases of goods and services in the local area and because of the short time period that most of the various construction craftpersons would reside in Kemmerer and Diamondville. Furthermore, since the small number of induced jobs would occur in the summer months when the potential work force would be expanded by vacationing students, it was assumed that those jobs would be filled by existing Kemmerer and Diamondville residents.

^bIndirect project-related jobs associated with the operation work force were based on a total employment to basic employment multiplier for Lincoln County of 2.03 (Wyoming Department of Administration and Fiscal Control 1982). This means that for every long-term Road Hollow operation worker, 1.03 jobs would be created in the county. For purposes of analysis, all indirect workers were assumed to be in-migrants to Kemmerer and Diamondville

^cThe number of indirect workers was based on 26 operation workers.

^dThe number of indirect workers was based on 39 operation workers.

Table 3-8. ESTIMATED POPULATION IN-MIGRATION DUE TO PROPOSED ACTION, KEMMERER AND DIAMONDVILLE:
1983-1986

Type of Job	1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Construction																
Direct ^a	--	--	210	241	241	327	350	156	62	62	140	218	226	233	233	156
Indirect	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	--	--	210	241	241	327	350	156	62	62	140	218	226	233	233	156
Operation																
Direct ^b	--	--	--	--	46	78	90	75	75	75	75	75	75	128	128	113
Indirect	--	--	--	--	46	78	78	78	78	78	78	78	78	116	116	116
Total	--	--	--	--	92	156	168	153	153	153	153	153	153	244	244	229
Total																
Direct	--	--	210	241	287	405	440	231	137	137	215	293	301	361	361	269
Indirect	--	--	0	0	46	78	78	78	78	78	78	78	78	116	116	116
TOTAL	--	--	210	241	333	483	518	309	215	215	293	371	379	477	477	385

Source: Woodward-Clyde Consultants 1982.

^aThe totals assumed that 20 percent of the construction work force would move family members to Kemmerer and Diamondville (Herr 1982); and that the average household size associated with those workers would be 2.78, the 1980 average for Wyoming (Census Retrieval Information Service 1981).

^bThe totals were based on the 1980 average household size for Kemmerer (2.97) and Diamondville (2.84). An average of 2.90 was used (Census Retrieval Information Service 1981).

Table 3-9. PROJECT-RELATED POPULATION COMPARED TO PROJECTED KEMMERER-DIAMONDVILLE POPULATION: 1983-1986

Year/Quarter		Construction Period Population Increase	Operation Period Population Increase	Total Population Increase	Annual Projected Kemmerer- Diamondville ^a Population	Project-Related Population as a Percentage of Projected Kemmerer- Diamondville Population
1983	1	--	--	--	5380	--
	2	--	--	--	5380	--
	3	210	--	210	5380	3.9
	4	241	--	241	5380	4.5
1984	1	241	92	333	5468	6.1
	2	327	156	483	5468	8.8
	3	350	168	518	5468	9.5
	4	156	153	309	5468	5.7
1985	1	62	153	215	5545	3.9
	2	62	153	215	5545	3.9
	3	140	153	293	5545	5.3
	4	218	153	371	5545	6.7
1986	1	226	153	379	5616	6.7
	2	233	244	477	5616	8.5
	3	233	244	477	5616	8.5
	4	156	229	385	5616	6.9

Source: Woodward-Clyde Consultants 1982.

^aTotal represents projected primary population (Briscoe, Maphis, Murray and Lamont, Inc. 1982b).

Table 3-10. ESTIMATED HOUSING DEMAND DUE TO PROPOSED ACTION, KEMMERER AND DIAMONDVILLE: 1983-1986

Type of Job/Housing	1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Construction:																
Direct	--	--	135	155	155	210	225	100	40	40	90	140	145	150	150	100
Indirect	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	--	--	135	155	155	210	225	100	40	40	90	140	145	150	150	100
Operation:																
Direct	--	--	--	--	16	27	31	26	26	26	26	26	26	44	44	89
Indirect	--	--	--	--	16	27	27	27	27	27	27	27	27	40	40	40
Total	--	--	--	--	32	54	58	53	53	53	53	53	53	84	84	79
Total:																
Temporary	--	--	135	155	155	211	230	100	40	40	90	140	145	155	155	100
Permanent	--	--	0	0	32	53	53	53	53	53	53	53	53	79	79	79
TOTAL ^a	--	--	135	155	187	264	283	153	93	93	143	193	198	234	234	179

Source: Woodward-Clyde Consultants 1982.

^aThe estimates assume 1 dwelling unit for each project-related worker.

housing. This demand would range from 230 dwelling units in the third quarter of 1984 to 40 units in the first half of 1985. The increased demand for temporary housing in Kemmerer and Diamondville is not considered a significant impact because the applicant would provide housing for in-migrating construction workers, if necessary, as part of the applicant's housing plan. Demand for permanent housing would begin in the first quarter of 1984, with 32 dwelling units, and would increase to a total of 79 in 1986. The demand for permanent housing would be met through planned additions to the Kemmerer and Diamondville housing supply.

Based on the BLM's recent experience with similar energy-related projects in Lincoln and Uinta counties, it is assumed that some portion of the project's construction work force would reside illegally on public lands in temporary housing units (such as tents, campers, or travel trailers). According to the BLM, this activity would occur whether or not temporary housing would be available in nearby communities.

Public Services and Facilities. The in-migration of project-related workers and their families would increase demands for public services and facilities in Kemmerer and Diamondville. While project-related demands for water, wastewater, solid waste disposal, law enforcement, fire protection, parks and recreation, health services, and libraries would be too small and temporary to be significant, potential impacts could be more important in the following areas:

- Public schools. In-migrating students (children of operations workers) could strain the operating budget of Lincoln County School District No. 1 (since students would attend school in District No. 1 and Lincoln County School District No. 2 would receive the project-related ad valorem tax revenues).

- Community traffic. Construction workers could significantly increase noise and congestion levels and traffic flows on main thoroughfares in Kemmerer and Diamondville.
- Social services. Project-related demands on social service agencies could exacerbate future shortages of staff and facilities.

However, the intensity of these impacts would be reduced by the applicant-committed practices listed in Chapter 1.

Public Finances. The principal taxes associated with the proposed action that would affect the geographic area of influence include ad valorem taxes on real property and on gas production, mineral severance and excise taxes, and sales and use taxes.

Tables 3-11 and 3-12 provide an example of the potential ad valorem revenues that would be generated by the Road Hollow project. As shown, ad valorem revenues associated with the production of natural gas are the largest and most important revenues to the affected taxing jurisdictions. For example, in 1984, project-related ad valorem revenues on real property in Lincoln County School District No. 2 would be \$198,800 compared with over \$4 million for ad valorem revenues on natural gas production. Based on 1982 tax rates, of the total revenues in Lincoln County School District No. 2, \$2.1 million would be allocated to the school district, \$1.8 million would be returned to Lincoln County, and the remainder would be distributed to two special districts. An increase in ad valorem revenues of this magnitude would represent a significant addition in net revenues to both Lincoln County and Lincoln County School District No. 2.

Table 3-13 shows the estimated Road Hollow project mineral severance and excise taxes in 1984 and 1986, following the completion of modules 1 and 2. While

Table 3-11. ESTIMATED AD VALOREM REVENUES ON REAL PROPERTY, ROAD HOLLOW PROJECT (Year Following Completion)

Project Component	County	School District	Miles	Total Cost ^a	Taxable Value	Tax Rate per \$1000 ^c	Year 1 Tax Amount
Treatment Plant ^d							
Module 1 (1984)	Lincoln	2	N.A.	\$30,000,000	\$2,376,000	\$72.697	\$172,728
Module 2 (1986)	Lincoln	2	N.A.	30,000,000	2,376,000	72.697	172,728
Total	-	-	-	\$60,000,000	\$4,752,000	-	\$345,456
Sales Gas Pipeline	Lincoln	2	7.1	\$1,775,000	\$140,580	\$72.697	\$10,220
Total	Uinta	1	0.7	175,000	13,860	64.633	896
	-	-	7.8	\$1,950,000	\$154,440	-	\$11,116
Condensate Pipeline	Lincoln	2	7.1	\$710,000	\$56,232	\$72.697	\$4,088
Total	Uinta	1	13.7	1,370,000	108,504	64.633	7,013
	-	-	20.8	\$2,080,000	\$164,736	-	\$11,101
NGL Pipeline	Lincoln	2	7.1	\$710,000	\$56,232	\$72.697	\$4,088
Total	Uinta	1	13.7	1,370,000	108,504	64.633	7,013
	-	-	20.8	\$2,080,000	\$164,736	-	\$11,101
Gas Gathering Lines							
Well #4	Lincoln	2	0.7	\$70,000	\$5,540	\$72.697	\$403
Well #7	Lincoln	2	1.9	190,000	15,048	72.697	1,084
Well #8	Lincoln	2	0.3	30,000	2,376	72.697	173
Well #9	Lincoln	2	1.8	190,000	14,256	72.697	1,036
Well #10	Lincoln	2	2.0	200,000	15,848	72.697	1,152
Well #11	Lincoln	2	1.3	130,000	10,296	72.697	748
Well #12	Lincoln	2	1.2	120,000	9,504	72.697	691
Well #13	Lincoln	2	1.8	180,000	14,256	72.697	1,036
Total	-	-	11.0	\$1,100,000	\$87,124	-	\$6,333
Transmission Line	Lincoln	2	2.0	\$240,000	\$19,008	\$72.697	\$1,382

Source: Woodward-Clyde Consultants 1982.

^aTotal cost for pipelines was calculated at \$25,000/inch/mile. The sales gas pipeline would be 10 inches in diameter; the condensate, NGL, and gas-gathering pipelines would be 4 inches in diameter. Total cost for the 138-kV transmission line would be \$120,000/mile (Everett 1982). Costs are in 1982 dollars.

^bTaxable value was determined by indexing total cost to 1967 dollars (0.3168 deflator) and multiplying the indexed value by 25 percent.

^cTax rates for 1982 were used (Floyd 1982; Decker 1982).

^dTotal cost includes access roads.

Table 3-12. ESTIMATED AD VALOREM REVENUES ON MINERAL PRODUCTION, ROAD HOLLOW PROJECT:
1984-1986

Production Level (MMSCFD) ^a	Year	Gas Price (per MCF) ^b	Royalty	Taxable Value	School District (Lincoln County)	Tax Rate per \$1,000 ^c	Tax Amount ^d
40	1984	\$4.36	12.5%	\$55,699,000	2	72.697	\$4,049,150
40	1985	\$4.97	12.5%	\$63,491,000	2	72.697	\$4,615,660
80	1986	\$5.28	12.5%	\$134,904,000	2	72.697	\$9,807,116

Source: Woodward-Clyde Consultants 1982.

^aFor the purposes of analysis, it was assumed that Modules 1 and 2 would be in full production in January 1984 and January 1986, respectively. According to Exxon, the first and second modules would be brought on line in the fourth quarter of 1984 and 1986, respectively, and both would be in full production by January 1985 and January 1987, respectively.

^bPrice is based on projections made by the Wyoming Legislative Service Office (Wyoming Legislative Service Office 1982).

^cTax rates for 1982 were used (Floyd 1982; Decker 1982).

^dTax is estimated in 1982 dollars.

Table 3-13. ESTIMATED MINERAL SEVERANCE AND EXCISE TAXES, ROAD HOLLOW PROJECT: 1984
AND 1986

Production Level (MMSCFD) ^a	Year	Gas Price (per MCF) ^b	Royalty	Taxable Value	Gas Severance and Excise Tax	Total Tax Amount ^c	Tax Distribution ^d		
							Kenmerer	Diamondville	County
40	1984	\$4.36	12.5%	\$55,699,000	6%	\$3,341,940	\$12,164	\$3,717	\$10,820
80	1986	\$5.28	12.5%	\$134,904,000	6%	\$8,094,240	\$29,462	\$9,001	\$26,205

Source: Woodward-Clyde Consultants 1982.

^aFor the purposes of analysis, it was assumed that Modules 1 and 2 would be in full production in January 1984 and January 1986, respectively. According to Exxon, the first and second modules would be brought on line in the fourth quarter of 1984 and 1986, respectively, and both would be in full production by January 1985 and January 1987, respectively.

^bPrice is based on projections made by the Wyoming Legislative Service Office (Wyoming Legislative Service Office 1982).

^cTax is estimated in 1982 dollars.

^dThe distribution of the tax to Kenmerer, Diamondville, and Lincoln County is based on 1980 census data.

the total tax collected by the state is estimated at \$3.3 million in 1984 and \$8.1 million in 1986, the amount allocated to Kemmerer, Diamondville, and Lincoln County is small and would represent an insignificant portion of the total severance and excise taxes received by those jurisdictions. For example, the 1984 Road Hollow project severance and excise taxes are estimated to be less than 5 percent of the total severance and excise tax allocated to either Kemmerer or Diamondville, or to Lincoln County.

The sales and use taxes associated with worker and contractor purchases of goods and services for the project would also represent a beneficial impact to the jurisdictions receiving the revenues (Kemmerer, Diamondville, and Lincoln County). However, like mineral severance and excise taxes, the magnitude of the project-related taxes would not represent a significant increase in total sales and use taxes to those jurisdictions.

Cumulative Impacts. As shown in Table 3-14, the upgrading of U.S. 189, the development of the South Haystack Coal Mine and Anschutz Ranch East, and the construction of the Craven Creek Plant and the Cave Creek Sour Gas Gathering System are the projects that are the most important in the cumulative impact analysis. Based on the proposed schedules, the construction and operation of the Road Hollow project would not contribute significantly to labor force requirements in quarters when regional labor demand would be high. In contrast, with the Road Hollow project, large changes in regional work force supply and demand would be lessened. If in the cumulative impact scenario fewer local Kemmerer and Diamondville residents would be available to work on the Road Hollow project, the number of project-related in-migrants would be larger and their potential socioeconomic impacts to Kemmerer and Diamondville would be greater. However, because the analysis for the Road Hollow project assumed that all direct and indirect Road

Hollow project workers would in-migrate to Kemmerer and Diamondville, the project-related impacts identified in the Road Hollow analysis would not change.

Because the applicant would provide housing for in-migrating construction workers (if necessary) as part of the applicant's housing plan, the Road Hollow project's demand for housing in Kemmerer and Diamondville would not significantly increase the overall supply and demand for housing in those communities. In addition, the demand for temporary housing by the remaining projects in the cumulative analysis would be relatively small because: 1) the projects with the largest work forces (Anschutz Ranch East, Craven Creek, and Cave Creek) would also provide worker housing at or near their respective project sites, and 2) workers on the Frontier Pipeline and on U.S. 189 would probably choose to reside on a temporary basis in communities other than Kemmerer and Diamondville as their work site moved away from those towns. Furthermore, while the majority of the in-migrating work force associated with the Skull Point Coal Mine would choose Kemmerer or Diamondville as their permanent place of residence, and some portion (50 percent or less) of the South Haystack Mine work force would also reside in the geographic area of influence, the total demand for permanent housing in Kemmerer and Diamondville, including the Road Hollow project, could be accommodated, based on the project schedule.

In the cumulative analysis, the in-migration of additional workers and their families would further increase demands for public services and facilities in Kemmerer and Diamondville. It is assumed that the increased demands on water, wastewater, solid waste disposal, law enforcement, fire protection, parks and recreation, health services, and libraries could be met. In addition, it is assumed that while those increased demands would potentially result in significant impacts to public education, community

Table 3-14. NET CHANGES IN BASELINE AND CUMULATIVE PROJECT WORK FORCES: 1983-1986

Project	1983			1984			1985			1986		
U.S. 189	110	0	(110)	-	-	40	60	(100)	-	40	60	(100)
Opal Gasoline Plant	-	100	50 (150)	-	-	-	-	-	-	-	-	-
Frontier Pipeline	-	135	0 0 (135)	-	-	-	-	-	-	-	-	-
Skull Point Coal Mine	-	-	62 0	0	0	0	0	0	0	0	0	0
South Haystack Coal Mine	-	-	-	30	0	0	0	40	45	40	70	0 45 0
Craven Creek Plant	-	-	-	-	-	200	0	0	700	0	0	600 0 (320)
Anschutz Ranch East*	202	90	96 0	183	(66) (111)	(90)	378	182	92	(312)	(447)	27 (95) (31)
Cave Creek Sour Gas Gathering System	-	-	-	-	140	0 (120)	(20)	-	-	-	-	-
Total Net Change	312	325	98 (150)	78	114 149 (310)	398	967	197	(372)	(377)	677	10 (451)
Road Hollow Project Net Change	-	-	135 20	16	66 19 (130)	(60)	0	50	5	23	0 (58)	0

Source: Woodward-Clyde Consultants 1982.

*The estimated work force in the fourth quarter of 1982 is 253 persons (Hafner 1982).

Note: Numbers in parentheses indicate decreases.

traffic, and social services, the impacts to those public services due to the Road Hollow project would be mitigated.

Alternatives

Differences in the potential socioeconomic effects resulting from the construction and operation of the alternatives for the sales gas, condensate, NGL, and gas gathering pipelines; the transmission line; and the processing and disposal of H₂S would be negligible when compared with the potential impacts due to the proposed action. This includes potential impacts on employment and income, population, housing, public services and facilities, and public finances. Table 3-15 illustrates the potential ad valorem revenues on real property that could be generated for the project alternatives during the first year following completion of each facility.

Access Road. The utilization of the existing Amoco sulfur haul road as the access road would change the location of the majority of the Road Hollow project's potential socioeconomic impacts from Kemmerer and Diamondville to Evanston. The commuting distance to the plant site (via the Amoco road) from Kemmerer and Diamondville or Evanston would be nearly equal (55 and 60 miles, respectively). Moreover, workers utilizing WY 89 and the Whitney Canyon and Bear River Divide roads could reduce the commuting distance from Evanston to Road Hollow by approximately 25 miles (see Map 1-1). Thus, under this alternative, it is assumed that most in-migrating workers would choose to live in Evanston rather than in Kemmerer or Diamondville because of the potentially shorter commuting distance from Evanston's larger size, availability of housing, and other amenities.

While the location of the potential impacts would shift to Evanston under this alternative, even if it were assumed that the project's entire work force in-migrated to Evanston, the type and magni-

tude of the resulting potential project-related socioeconomic impacts would not change substantially from the impacts identified for the proposed action. For example, it is anticipated that Evanston would have sufficient temporary and permanent housing to accommodate both the construction and operation work forces. In addition, because workers would reside in dwelling units that are part of the city's existing infrastructure, there would be no significant project-related impacts to Evanston's water, wastewater, or solid waste disposal systems. Project related increases in the local population would increase the demand for public safety, community recreation, libraries, and health services. However, due to the small size of the project-related in-migration (compared to the city's projected total population), the Road Hollow project would not significantly affect those public services and facilities.

Nonetheless, as in Kemmerer and Diamondville under the proposed action, potential impacts to two components of Evanston's socioeconomic environment--public schools and social services--could be important under this alternative. First, in-migrating school-age children could strain the operating budget of Uinta County School District No. 1 since Lincoln County School District No. 2 would receive the project-related ad valorem tax revenues. However, as Wyoming is in the process of restructuring its school finance procedures, it is uncertain whether Lincoln County School District No. 2 could or would be made by law to transfer funds to Uinta County School District No. 1 to offset project-related operation costs. The applicant would monitor this situation through contact with the respective districts and Wyoming state officials to identify or create mechanisms to help defray Uinta County School District No. 1 expenses during operation-related use periods. (Applicant participation would be only for school overload situations created by the Road Hollow project operation-period

Table 3-15. ESTIMATED AD VALOREM REVENUES ON REAL PROPERTY, ROAD HOLLOW ALTERNATIVES
(Year Following Completion)

Project Component/ Alternative	County	School District	Miles	Total Cost ^a	Taxable Value	Tax Rate Per \$1,000 ^c	Yearly Tax Amount
Sales Gas Pipeline:							
Alternative 1	Lincoln	2	7.1	\$ 1,775,000	\$ 140,580	\$ 72.697	\$ 10,220
	Uinta	1	10.4	2,600,000	205,920	64.633	13,309
Total	-	-	17.5	\$ 4,375,000	\$ 346,500	--	\$ 23,529
Alternative 2	Lincoln	2	10.2	\$ 2,550,000	\$ 201,960	\$ 72.697	\$ 14,682
	Lincoln	1	7.3	1,825,000	144,540	76.699	11,086
Total	-	-	17.5	\$ 4,375,000	\$ 346,500	-	\$ 25,768
Condensate Pipeline:							
Alternative 1	Lincoln	2	7.1	\$ 710,000	\$ 56,232	\$ 72.697	\$ 4,088
	Uinta	1	26.7	2,670,000	211,464	64.633	13,668
Total	-	-	33.8	\$ 3,380,000	\$ 267,696	-	\$ 17,756
NGL Pipeline:							
Alternative 1	Lincoln	2	7.1	\$ 710,000	\$ 56,232	\$ 72.697	\$ 4,088
	Uinta	1	26.7	2,670,000	211,464	64.633	13,668
Total	-	-	33.8	\$ 3,380,000	\$ 267,696	-	\$ 17,756
Gas Gathering Pipelines							
Well #7 Alternative	Lincoln	2	2.0	\$ 200,000	\$ 15,840	\$ 72.697	\$ 1,152
Well #8 Alternative	Lincoln	2	0.4	40,000	3,168	72.697	230
Well #9 Alternative	Lincoln	2	2.4	240,000	19,008	72.697	1,382
Well #10 Alternative	Lincoln	2	4.6	460,000	36,432	72.697	2,648
Total	-	-	9.4	\$ 940,000	\$ 74,448	-	\$ 5,412
Transmission Line							
Alternative 1	Lincoln	2	7.1	\$ 213,000	\$ 16,870	\$ 72.697	\$ 1,226
	Uinta	1	0.3	9,000	713	64.633	46
Total	-	-	7.4	\$ 222,000	\$ 17,583	-	\$ 1,272

Source: Woodward-Clyde Consultants 1982.

^aTotal cost for pipelines was calculated at \$25,000/inch/mile. The sales gas pipeline would be 10 inches in diameter; the condensate, NGL, and gas gathering pipelines would be 4 inches in diameter. Total cost for the 40-kv distribution line was calculated at \$30,000/mile (Everett 1982). Costs are in 1982 dollars.

^bTaxable value was determined by indexing total cost to 1967 dollars (0.3168 deflator) and multiplying the indexed value by 25 percent.

^cTax rates for 1982 were used (Floyd 1982; Decker 1982).

use.) Second, project-related demands on Evanston area social service agencies could exacerbate future shortages of staff and facilities. In this case, the applicant would establish a monitoring system in conjunction with agencies or persons such as the Uinta Human Resources Confederation or the Uinta County Human Resources Coordinator. If it is determined that social service agencies do experience significant staffing or facility shortages due to demands by project-related workers (which would be documented by the agency), the agencies would receive assistance from the applicant to help meet the additional needs resulting from the project (Exxon 1982). Therefore, the potential project-related impacts to public schools and social vices would not be considered significant.

Worst-Case Construction Schedule. The differences in the potential socioeconomic impacts to Kemmerer and Diamondville when assuming a worst-case construction schedule as compared with the schedule outlined for the proposed action would be minimal. As illustrated in Table 3-16, the worst-case schedule does not differ substantially from the proposed action schedule. An increase of 20 additional drillers would not result in important changes in the type or level of socioeconomic impacts identified for the proposed action because the increase is small and the workers would not be part of the project's permanent work force. Likewise, the addition of 50 workers in the third quarter of 1984 for the construction of access roads and gas gathering lines would not change substantially the type and level of impacts identified in the peak construction period under the proposed action.

Cumulative Impacts. Only one alternative to the proposed action (use of the existing Amoco sulfur haul road as the access road) would result in any substantial changes to the potential socioeconomic impacts to Kemmerer and Diamondville under the cumulative impact

analysis. As described above, while the use of the alternative access road would shift the location of the potential impacts from Kemmerer and Diamondville to Evanston, it is not anticipated that the type and magnitude of the resulting socioeconomic impacts would change substantially from those identified for the proposed action.

LAND USE CONTROLS AND CONSTRAINTS

The proposed action or alternatives would not be in conflict with existing or proposed land use plans, regulations, or programs. The Road Hollow project would be located primarily on federal and private land. The federal land is managed by the BLM, in accordance with the BLM Pioneer Trails Management Framework Plan (MFP). The Road Hollow project would not conflict with the goals and objectives of the MFP. Furthermore, no designated Area of Critical Environmental Concern (ACEC) would be affected by the project components, nor would there be conflicts with Wild and Scenic Rivers inventoried by the former Heritage Conservation and Recreation Service.

The project would not be in conflict with either Lincoln County's Land Development and Permit Process Resolution or Uinta County's Land Use Resolution.

HEALTH AND SAFETY

The primary hazard associated with the proposed plant and gas gathering system is the potential for the release of substantial quantities of untreated, sour gas. Such a release could pose a threat to health and safety because of H_2S in the untreated gas. During periods of plant upset--i.e., periods of non-routine operations that can be accommodated within plant design capabilities--the H_2S -rich gas would be incinerated by a flare and no H_2S health hazard would result. However, a rupture in one of the gathering lines or damage within the gas treatment plant due to such factors as equipment failure or major equipment

Table 3-16. ESTIMATED TOTAL WORK FORCE ASSUMING WORST CASE SCHEDULE, ROAD HOLLOW: 1983-1986

	1983				1984				1985				1986				1987 + (Per Year)
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
CONSTRUCTION																	
Field																	
Gas Gathering Lines & Access Roads	-	-	-	-	-	-	-	40	-	-	-	20	-	-	-	20 (Peak) (Complete in 1987)	
Sulfur Haul Road ^a	-	-	-	-	-	-	-	55	-	-	-	-	-	-	-	-	
Drilling ^b	-	-	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
Product Pipelines	-	-	-	-	-	50	50	-	-	-	-	-	-	-	-	-	
Total Field	-	-	60	60	60	110	205	60	60	60	80	60	60	60	80	80 (Peak) (Complete in 1987)	
Treating Plants																	
Modules	-	-	30	100	105	110	90	60	-	-	30	100	105	110	90	60	
Electrical/Telephone Systems	-	-	15	15	10	10	-	-	-	-	-	-	-	-	-	-	
Switch Rack/138 kV Transmission Line	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Plant	-	-	65	115	115	120	90	60	0	0	30	100	105	110	90	60	
Total Construction	-	-	125	175	175	230	295	120	60	60	110	160	165	170	170	120	
OPERATION																	
Field Operation and Maintenance	-	-	-	-	-	4	4	4	4	4	4	4	4	5	5	5	
Treating Plants	-	-	-	-	16	23	23	18	18	18	18	18	18	31	31	26	
Sulfur Hauling ^c	-	-	-	-	-	-	4	4	4	4	4	4	4	8	8	8	
Total Operations	-	-	-	-	16	27	31	26	26	26	26	26	26	44	44	39	
GRAND TOTAL	-	-	125	175	191	257	326	146	86	86	136	186	191	214	214	159	

Source: Exxon 1982.

^a Sulfur haul road, gas gathering lines, and access roads would be constructed in summer of 1984. This moves 50 workers from the third quarter of 1983 to the third quarter of 1984.^b One exploration drilling rig and 20 workers would be added.^c Assumes utilization of local contractors.

malfunction could cause a release of H₂S-rich gas.

The probability of a gathering line rupture or damage to plant facilities cannot be quantified. However, if damage occurs, four factors would limit the amount of H₂S emitted and potential impacts to health and safety: 1) wells would be equipped with automatic shut-in valves at the wellhead that would close if there was a loss of line pressure or with high pressure in the line; this feature would therefore also prevent rupturing because of overpressure; 2) since the estimated H₂S content of the gas to be processed is only 0.5 percent, the amount of H₂S released during a rupture would be relatively low compared to that from similar operations in the area; 3) atmospheric dispersion in the project region is typically good, with an average wind speed of about 10-14 miles per hour, and because of the relatively low concentrations of H₂S in the gas, H₂S levels would be expected to decrease rapidly with distance from the rupture; 4) gathering lines and plant facilities are located in a relatively remote area away from any population centers.

During normal operations, SO₂ emissions would come from the sulfur recovery unit's tail gas incinerator. However, during periods of plant upset, SO₂ would be emitted from the plant's emergency flare. These emissions would persist for only a short period of time. Impacts from flaring were estimated using the EPA PTMAX model (Turner and Busse 1973). Results indicate that, even under worst-case meteorological conditions, SO₂ concentrations would be less than 50 percent of the 3-hour ambient standard.

An alternative to the removal of sulfur from the processed gas stream is the use of the ATS process. This process would require the delivery of ammonia to the plant site by one truck every 4 days. In the event of a truck accident, a large quantity of liquid ammonia may be

spilled. Most of this material would be expected to pool or soak into the soil. However, a certain amount would vaporize and be dispersed in the atmosphere. The amount that would vaporize would be determined by the temperature, wind speed, and relative humidity.

As previously discussed, atmospheric dispersion conditions in the project area are typically good with average wind speeds of approximately 10 miles per hour. Thus, ammonia vapor would typically be transported and diluted relatively quickly. The project area is also rural in nature. Because of these factors, no residences would be expected to be exposed to hazardous levels of ammonia.

ENERGY USE

The following analysis presents the primary energy inputs to the facility, the major ancillary energy inputs, and the energy-containing outputs of the facility. This allows calculation of the amount of energy lost due to plant operation. Energy required to construct the plant and to transport workers to the plant is not included in the analysis because these are not major uses of energy compared with plant operations.

According to the applicant, each plant unit would have three major energy inputs. The most important is 40 million scfd of input sour gas. Some of this gas would be burned as fuel for the plant and the rest would be converted to products for sale. In addition to natural gas, each unit is expected to require approximately 2.8 megawatts of electricity when operating at rated capacity. Finally, each unit would require approximately 1.2 million gallons of diesel fuel to drill the wells necessary for supply of feed (sour) gas. For the purpose of this analysis, use of electricity and diesel fuel is prorated over the 20-year project life. The total daily energy inputs are summarized below:

<u>Input</u>	<u>Amount/Day</u>	<u>Btu/Unit</u>	<u>Btu/Day</u>
Sour Gas	40×10^6 scf	1295 Btu/scf	5.18×10^{10}
Electricity	67,200 kWh	3410 Btu/kWh	2.29×10^8
Diesel Fuel	164 gal	1.44×10^5 Btu/gal	2.36×10^7
Total for 1 Unit	---	---	5.21×10^{10}
Total for 2 Units	---	---	1.04×10^{11}

These inputs would be used to produce the major energy-containing outputs. The plant would produce 31 million scfd of sales gas (excluding gas used in the plant processes), 416,000 lb/d of natural

gas liquids, 552,000 lb/d of condensate, and 16,780 lb/d of sulfur for sale. The energy content of these products is summarized below.

<u>Product</u>	<u>Amount/Day</u>	<u>Btu/Unit</u>	<u>Btu/Day</u>
Sales Gas	31×10^6 scf	927	2.87×10^{10}
Natural Gas			
Liquids	416,000 lb	20,200 Btu/lb	8.40×10^9
Condensate	552,000 lb	23,765 Btu/lb	1.31×10^{10}
Sulfur Product	16,780 lb	3685 Btu/lb	6.18×10^6
Total for 1 Unit	---	---	5.02×10^{10}
Total for 2 Units	---	---	1.00×10^{11}

The ratio of energy inputs to outputs for the plant is approximately 0.96. This means that 96 percent of all the energy that would be input to the processing plant (including the energy in unprocessed natural gas) would be recovered as usable energy.

Ammonium Thiosulfate Process (ATS)

According to the applicant, the ATS process would be comparable to the proposed Claus system in sulfur-removal efficiency but would produce more excess steam as a by-product. This could reduce the amount of fuel gas required for process heat in the plant and could thus increase the ratio of energy outputs to inputs.

SUGGESTED MITIGATION

Mitigation measures were developed based on findings from impact assessment. A large number of these were incorporated by the applicant into the proposed action project description and the section on applicant-committed practices (Chapter

1). These were assumed to be implemented for the purposes of the analysis, since the applicant would be required to incorporate them into the Plan of Operations. In addition, BLM standard stipulations and mitigation measures imposed or required by federal, state, county, or municipal laws or regulations were assumed for purposes of analysis.

The following mitigation measure was not assumed for purposes of analysis, but it is recommended to further mitigate impacts that would result from the proposed action. The applicant and the BLM should monitor the success of required revegetation efforts until ground cover is reestablished in order to control erosion. This monitoring program should also include evaluation of methodologies and potential for reestablishing wildlife habitat. Evaluation and implementation of a program for reestablishment of wildlife habitat should be accomplished by the applicant in consultation with the BLM and with input from other appropriate management agencies.

UNAVOIDABLE ADVERSE IMPACTS

This section presents the site-specific unavoidable adverse impacts that would result from the proposed Road Hollow project. This discussion supplements and is tiered to a more general discussion presented in Chapter V of the Kemmerer EAR.

AIR QUALITY

The operation of the gas treatment facility would result in emission of 49 tons per year of SO_2 . These emissions would be well below the Wyoming DEQ air emission standard. Dust pollution would increase due to additional vehicle traffic in the area during construction of the gas treatment plant and ancillary facilities. Accidental release of H_2S could result in unavoidable adverse impacts.

MINERAL RESOURCES

At full production, the plant would process 80 million cubic feet of well gas per day. Construction of the plant and ancillary facilities would require approximately 120,000 yards of gravel. Both of these impacts constitute a commitment of nonrenewable resources.

PALEONTOLOGY

Significant fossils within construction ROWs that are not detected and recovered during surficial inventories, construction monitoring, or preconstruction data recovery would be adversely affected by construction activities. Significant fossils in locations outside construction areas could be removed by hobbyists or commercial collectors. Both of these impacts constitute a commitment of a nonrenewable resource.

SOILS

An undetermined amount of increased soil erosion would occur from surface

disturbance of areas during the construction of the proposed project.

WATER RESOURCES

Small, short-term increases in the suspended solids content and turbidity of affected drainages would result from construction activities. The magnitude and duration of such increases would decrease as reclamation and revegetation efforts became successful.

The quantity of contaminants transported in affected drainages would increase as a result of spills and other discharges.

VEGETATION

The long-term disturbance of areas suitable for the growth of vegetation would be an unavoidable adverse impact resulting in the loss of vegetation productivity. This impact would primarily result from construction of the proposed plant site (40 acres).

WILDLIFE

Unavoidable adverse impacts of the project components on wildlife would be: 1) loss of small areas of crucial winter mule deer range (alternative condensate-NGL pipeline to Divide Junction, alternative sales gas pipeline to Kemmerer compressor station); 2) loss of small areas of big-game fawning and calving areas; 3) general disturbance of sensitive species (including mule deer and raptors), potentially resulting in reduced reproductive success; 4) disturbance of wintering mule deer during the period November 1983 - May 1984 in the area of crucial winter range located between mileposts 6.7-19.0 of the proposed temporary access road, potentially resulting in reduced reproductive success and mortality of individuals in the Wyoming Range herd unit; 5) mortality of certain species (primarily big game) resulting from increased road kills on access roads; and 6) mortality

of certain species (primarily big game, sage grouse, and raptors) resulting from increased levels of legal and illegal hunting (primarily during the construction period).

LIVESTOCK AND RANGE

Construction and operation of the proposed action would result in a long-term loss (over the life of the project) of about 32 animal unit months (AUMs) per year for cattle or about 36 AUMs per year for sheep. Generally, the harassment of livestock would increase as a result of the construction and operation of the project.

CULTURAL RESOURCES

Construction activities may alter, damage, or destroy subsurface cultural resources not identified during surveys and may result in disturbance to, or loss of, horizontal and vertical subsurface cultural information. Mixing and loss of artifacts and stratigraphic data could also occur.

VISUAL RESOURCES

Visible signs of landscape disturbance from construction activities associated with pipeline ROWs and the plant site are unavoidable in this semiarid environment. Reclamation actions would help to reduce the extent of color and texture contrasts over the long term (3-5 years or more). Permanent facilities would add incrementally to the visual degradation of an area with noticeable oil and gas development.

RECREATION

Applicant-committed practices presented in Chapter 1 would reduce but not eliminate impacts to the quality of the recreational experience for Oregon Trail users where project components are within a quarter-mile of the trail.

SOCIOECONOMIC CONDITIONS

Based on recent experience with similar energy-related projects in Lincoln and Uinta counties, it is assumed that some portion of the project's construction work force would reside illegally on public lands in temporary housing units (such as tents, campers, or travel trailers). This activity would occur whether or not temporary housing were available in nearby communities. Temporary residence on public lands by project-related workers would be considered an unavoidable adverse impact.

RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The issuance of ROW permits by BLM would allow the processing of approximately 80 million scfd of natural gas over the project life of 20 years. Processing of this natural gas energy would help meet the nation's short-term energy needs, allow additional time to develop alternative energy sources, contribute to the reduction of this nation's balance of payment deficit, and reduce this country's dependence on an unpredictable and limited foreign oil supply. The authorizing actions required for the proposed project would result in short-term and long-term losses or alterations of natural resources and the human environment.

The following discussion supplements and is therefore tiered to Chapter VI of the Kemmerer Resource Area EAR.

Short-term use would consist of occupying the land for the purpose of producing of natural gas for a period of 20 years, or until the gas supply is depleted. Long-term productivity is defined as the continued use of the land by other activities, such as grazing, wildlife use, and recreation. The land is presently being used for these purposes, and these uses may continue after gas

production ends, although there may be losses in long-term productivity.

In the short term, there would be:

1. A reduction in air quality due to emissions from the processing plant and an increase in the total suspended particulates, due primarily to increased vehicular traffic. There would also be an increase in background noise levels near project facilities.
2. The potential destruction of or damage to paleontological or cultural resources not identified during surveys or not avoided during construction, and resources located in areas where surveys are not implemented.
3. Disturbance of about 917 acres of soils and topography and removal of vegetation would result in short-term increases (3-5 years) in erosion and soil surface instability.
4. A use of 32 acre-feet of water per year for operation and 160 acre-feet of water for construction.
5. Disturbance to 917 acres of wildlife habitat and a decrease in productivity of vegetation on these lands. A reduction of approximately 101 AUMs for cattle or 111 AUMs for sheep.

In the long term, there would be:

1. During the 20-year life of the project and after abandonment, emissions would ultimately be dispersed and eventually removed naturally from the atmosphere by wet and dry deposition. Noise pollution would cease with the abandonment of plant facilities.
2. Damage to or destruction of paleontological or cultural resources would result in a permanent loss of these resources for future investigation or public enjoyment. Discovery of paleontological and cultural resources during resource surveys

would result in potential new information for scientific investigation and an increased data base, and preservation of previously unknown resources for future studies and public enjoyment.

3. The loss of vegetative productivity on about 315 acres occupied by various facilities, or in areas that could not be revegetated to pre-disturbance levels. This would result in a reduction of approximately 32 AUMs for cattle or about 36 AUMs for sheep.
4. The Road Hollow project would enhance long-term productivity in the geographic area of influence through project-related jobs and taxes. It is estimated that the project would create approximately 80 direct and indirect operation-period jobs and would substantially increase local tax bases. The principal project-related revenues would include ad valorem taxes on mineral production (estimated at \$9.8 million in 1986), mineral severance taxes (estimated at \$8.1 million in 1986), and ad valorem taxes on real property (estimated at \$214,000 in 1984).

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Approximately 80 million scfd of natural gas would be processed and consumed. Energy in the forms of natural gas, petroleum products, electricity, and other sources would also be expended to process the natural gas reserves or would be consumed by the increased population in the area.

Various material used in the construction, operation, and maintenance of project facilities may not be reusable or recoverable and thus would be lost forever. Approximately 120,000 cubic yards of gravel would be needed for the construction of this project.

In those disturbed areas where reclamation/revegetation efforts may not be completely successful, loss of productive soil surface layers would constitute an irreversible and irretrievable commitment of the soil resource.

Any cultural or paleontological resources not recovered or avoided would be damaged or destroyed and would thus be an irreversible and irretrievable commitment of resources. In addition, any consumption of these resources by scientific

investigation also constitutes an irreversible and irretrievable commitment of resources.

Changes in topography resulting from the construction of the access road in areas that would require extensive cut and fill would be irretrievable to pre-disturbance condition during abandonment and restoration efforts.

Discussion of other irretrievable commitments of resources is presented in Chapter VIII of the Kemmerer EAR.

Chapter 4

CONSULTATION AND COORDINATION

TEAM ORGANIZATION

The Road Hollow Gas Plant Project EA was prepared through the third-party contractor approach, with the BLM Kemmerer Resource Area as the lead agency. A Memorandum of Understanding (MOU) has been signed by BLM and Exxon concerning this approach. Woodward-Clyde Consultants (WCC) was selected as the contractor to prepare the EA under the direction of the BLM Kemmerer Resource Area office. The MOU clearly establishes the roles between BLM, Exxon, and WCC. The BLM EA team was headed by Mr. Steve Howard, Area Manager, assisted by Mr. Dave McIlroy. This BLM EA team provided standards and guidance to the contractor concerning the nature, content, and scope of the EA. Contractor preparers and the BLM review team members are listed in Table 4-1.

COORDINATION IN PREPARATION OF THE PROPOSED ACTION

The proposed action as presented in Chapter 1 includes pertinent information from the proposed project planning basis submitted by Exxon on September 28, 1982, in a meeting at the Kemmerer Resource Area office. The BLM review team and WCC interdisciplinary preparers reviewed this material and requested additional information needed for clarification and further detail. Exxon responded to these requests in a series of written responses, and a description of the proposed action was finalized by the contractor.

PUBLIC CONSULTATION AND COORDINATION

During the preparation of the EA, meetings were held with several agencies and private organizations in order to receive comments pertaining to the identification of issues and the scope of analysis. Agencies and organizations that were met with and a summary of issues identified included:

- October 1, 1982, meeting with Kemmerer and Lincoln County government representatives. Issues identified included: the need for a mancamp; increased demand for housing; encouragement for use of existing corridors; water supply; and use of local work force.
- October 5, 1982, meeting with Uinta Land and Livestock Association. Issues identified included: potential impacts to east-west livestock movements; potential increase in livestock road kills; increased access to the area; encouragement for proper rehabilitation and revegetation to support livestock grazing.
- October 25, 1982, meeting with Overthrust Wildlife Association. Issues identified included: increased access to the Bear River Divide area; limitation of new access; rehabilitation of well-field mud pits to mitigate loss of wildlife habitat; encouragement for proper rehabilitation to mitigate loss of wildlife habitat.

Table 4-1. LIST OF PREPARERS.

Team Member	EA Responsibility	Education	Years Related Experience
<u>BLM Kemmerer Resource Area Office</u>			
Steve Howard	Area Manager and Team Leader	B.S. Forestry/ Range Management, Utah State University	15
Dave McIlnay	Co-Team Leader	B.S. Forestry/ Range Management, Colorado State University	6
Steve Cook	Water Resources	B.S. Hydrology, Utah State University	2
Dick McCuistion	Wildlife	B.S. Wildlife and Fisheries Management, Texas A&M University	7
Gary McNaughton	Geology and Minerals Paleontological Resources	B.S. Geology, Denison University	6
Harley Metz	Vegetation, Livestock/Range	M.S. Range Ecology, Colorado State University	10
Russell Storbo	Visual, Recreation, Wilderness	B.S. Park Administration, California State University, Sacramento	6
David Vlcek	Cultural Resources, Paleontological Resources	B.A. Western Illinois University	10
<u>BLM Rock Springs District Office</u>			
Renee Dana	District Environmental Coordinator	B.S. Range Management, University of Wyoming	9
Bruce Baker	Wildlife	Ph.D. Wildlife Ecology, Texas A&M	4

Table 4-1. LIST OF PREPARERS (continued)

Team Member	EA Responsibility	Education	Years Related Experience
Ray Christensen	Vegetation	B.S. Wildlife Management, M.S. Range Management, University of Wyoming	11
Bill McMahan	Climate, Air Quality, Noise, All Sections	B.S. Wildlife Management, Colorado State University	16
Bruce Smith	Aquatic Biology	B.S. Fish and Wildlife Management, University of Wyoming	10
Colin Voigt	Soils	B.S. Agronomy, University of Kentucky	4
John Young	Social and Economic Conditions Energy Use	B.S. Animal Science and M.S. Agricultural Systems, Colorado State University	4
<u>Woodward-Clyde Consultants</u>			
Janice R. Hutton	Project Manager	Ph.D. Sociology	17
Stephen D. Kellogg	Assistant Project Manager	M.S. Biology	10
Pamela Bergmann	Socioeconomic Conditions, Land Use Controls and Constraints	M.A. Geography	6
Edd Clark	Geology and Minerals	M.S. Geology	9
Marilyn Duffey-Armstrong	Visual Resources, Wilderness, Recreation, and Transportation Task Leader	M.S. Cybernetic Systems, B.A. Industrial Design	10

Table 4-1. LIST OF PREPARERS (concluded)

Team Member	EA Responsibility	Education	Years Related Experience
David Fee	Cultural Resources	M.A. Anthropology	5
Mara Feeney	Socioeconomic Conditions, and Land Use Controls and Constraints Task Leader	M.A. Planning, B.A. Anthropology	9
Perry Fontana	Air Quality Task Leader, Health and Safety	M.S. Meteorology	4
Gary Kaufman	Water Quality Task Leader	M.S. Environmental Engineering, B.S. Civil Engineering	9
Ruthann Knudson	Cultural and Paleontological Resources Task Leader	Ph.D. Anthropology	19
Scott Moorhouse	Wildlife, Aquatic Ecology, and Vegetation Task Leader	M.S. Environmental Biology, B.S. Biology	10
Roseanne Perman	Paleontology	B.A. Geology, Earth Sciences	6
Brenda Peters	Recreation and Wilderness	B.A. Sociology, Environmental Studies	2
Robert Ray	Soils, Prime Farmland, and Livestock and Range Task Leader	B.S. Natural Resources	5
Don Shute	Vegetation	M.S. Range Science	5
Mark Small	Air Quality	Ph.D. Chemistry	7
Gary Smith	Energy Use	M.S. Economic Systems	7
Don West	Geologic Hazards Task Leader	B.S. Geology	12

- November 2, 1982, meeting with Wyoming Game and Fish Department. Issues identified included: seasonal closure of Spring Creek Road to access; use of existing corridors; discouraging of new access; discouraging poaching by work force. Other potential impacts could include increased road kills, loss of wildlife habitat, increased poaching, and increased human disturbance.
- November 9, 1982, meeting with Minerals Management Service (MMS). This meeting was held to verify the scope of analysis for the MMS EA and the BLM EA. It was concluded that the MMS EA would address well-field development (drill pads and access roads) and the BLM EA would address all other project components, including gathering lines from wells to the proposed plant site.

Other federal, state, and local agencies consulted during the preparation of this EA include:

Lincoln County

Department of Public Assistance and Social Services
Office of Planning and Development
Office of the Treasurer
Sheriff's Department
Tax Assessor's Office

Lincoln-Uinta Association of

Governments

Town of Diamondville

Town Clerk's Office
Treasurer's Office

Town of Evanston

Building Department
Chamber of Commerce
Planning Department

Town of Kemmerer

Chamber of Commerce
Kemmerer Volunteer Fire Department
Mayor's Office
Police Department

Uinta County

Office of the Treasurer
Planning Department

Universities

University of Wyoming, Laramie

U.S. Department of Agriculture

Forest Service
Intermountain Regional Office,
Salt Lake City, Utah
Wasatch-Cache National Forest

Soil Conservation Service
Cheyenne, Wyoming
Evanston, Wyoming

U.S. Department of Defense

Army Corps of Engineers
Sacramento, California

U.S. Department of the Interior

Bureau of Land Management
Denver Regional Office
Rock Springs District Office
Kemmerer Resource Area
Salt Lake City District Office
Wyoming State Office

Bureau of Reclamation
Salt Lake City, Utah
Fish and Wildlife Service

Minerals Management Service
Rock Springs, Wyoming

National Park Service
Denver Service Center
Fossil Butte National Monument

U.S. Environmental Protection Agency

Region VIII Office, Denver, Colorado

Utah State

Division of Parks and Recreation

Wyoming State

Department of Administration and Fiscal Control
Department of Economic Planning and Development

Department of Environmental Conservation

Department of Environmental Quality

Employment Security Commission

Employment Service

Game and Fish Department

Geological Survey

Highway Department

Revenue and Taxation Department

State Engineer

State Historic Preservation Officer

State Lands Commission

Wyoming Association of Municipalities

Wyoming Mining Association

PUBLIC PARTICIPATION

A Notice of Scoping was published in the Federal Register on September 10, 1982, announcing the action to be analyzed in the EA; the area that would most likely be affected; preliminary issues and concerns; the scoping process to be used, with special emphasis on the scheduling of a public scoping meeting; and the location of BLM contacts for further information, submission of written comments, and availability of the public scoping documents.

The public scoping meeting announced in the Federal Register was held on

November 9, 1982, at the Senior Citizens Friendship Center in Kemmerer for the purpose of identifying issues and concerns for the Road Hollow Gas Plant Project EA. Analysis of the comments received from the scoping meeting indicated that the public felt the following general issues should receive emphasis in the environmental process:

- Impacts to wildlife habitat and wildlife species
- Social and economic impacts to Lincoln and Uinta counties
- Water supply and water quality, including disposition of wastewater
- Use of common and existing corridors
- Reclamation and restoration of disturbed areas
- Health and safety related to H₂S
- Cumulative impacts (emphasis on analysis of impacts to wildlife, social, and economic resources)

In addition to comments received at the meetings, the BLM received seven written comments from various agencies. Issues raised in the letters reflected concerns similar to those expressed at the public scoping meeting. Specific issues raised are provided in the document titled "Summary of Road Hollow Scoping Process and Conclusions."

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GLOSSARY

Alluvium Clay, silt, sand, and gravel or other rock material transported by flowing water and deposited as sorted or semisorted sediments.

Ambient Pertaining to the surrounding atmosphere; that portion of the atmosphere, external to buildings, to which the general public has access.

Ambient pollutant concentrations Existing levels of contaminants in the local or regional air, usually pertaining to concentrations of particulate matter, sulfur dioxides, nitrogen oxides, ozone, and trace elements.

Ancillary facilities Structures outside the actual plan that are necessary to support the major functions of the gas processing plants; e.g., well gathering lines, powerlines, pipelines, etc.

Animal-unit month (AUM) The amount of feed or forage required by an animal-unit for one month based upon average daily forage. An animal-unit is considered to be one mature (1000-lb) cow or approximately five sheep.

Aquifer One or more formations that contain sufficient permeable material to yield significant quantities of water to wells and springs.

Aspect The direction (north, south, east, west) that a topographic slope faces.

Attainment A designation issued by the EPA to indicate an area's compliance with all applicable National Ambient Air Quality Standards (NAAQS). An area that is in compliance with the particulate matter standard, for example, is termed "attainment" for this pollutant. An area that is shown by monitoring or modeling to exceed a standard is designated "non-attainment" for the particular pollutant(s).

Authorized officer The Bureau of Land Management employee to whom has been delegated by the BLM Wyoming State Director the duties and responsibilities for issuance, modification, protests, suspension, renewal, and/or termination actions associated with the rights-of-way proposed in this document.

Backfill Earth that is replaced after a construction excavation.

Barrels per day (BPD) A unit measuring the rate at which petroleum is produced, transported, or consumed. (Barrel is a unit of volume measure equal to 42 U.S. gallons.)

Bedrock A general term for the rock, usually solid, that underlies soil or other consolidated, superficial material.

Bentonite A soft, plastic, porous, light-colored rock composed of clay minerals that shrink when dried and swell up to 10 times actual size when wet.

Candidate species A species that is being reviewed by the Fish and Wildlife Service to determine if there is sufficient cause to propose the species for inclusion as threatened or endangered on the federal list.

Carrying capacity The maximum number of animals that can graze on a given area of range for a specific number of days each year without causing a decrease in forage production or degrading elements associated with vegetation, such as soils. Also known as Grazing Capacity.

Cation A positively charged atom or group of atoms.

Community A group of animal species and individuals that occur in a specific habitat or habitat type and have relationships of varying types between them.

Contrast The difference between adjacent parts in color and form, as used in BLM VRM System.

Crucial habitat That portion of a wildlife species' living area that is essential to the survival and perpetuation of the species, either as individuals or as a population.

Crucial winter range Range that is present in minimal amounts and is the determining factor in the potential for population maintenance and/or growth. This is usually represented by a winter concentration where most individuals of a population are forced during periods of maximum snow cover each year or where most individuals of a population are concentrated during periodic severe winters.

Cultural resources Remains of human activity, occupation, or endeavor, as reflected in sites, buildings, artifacts, ruins, etc.

Decibel A unit for expressing the relative intensity of sounds on a scale from 0 (for the average least perceptible sound) to about 130 (for the average pain level).

De minimis Emission levels defined by EPA in its PSD regulations. Projects that are subject to PSD are required to conduct air quality analyses for each pollutant emitted in amounts greater than the applicable de minimis level.

Endangered species Any species that is in danger of extinction throughout all or a significant portion of its range (Endangered Species Act 1973).

Ephemeral stream A stream that flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice. The stream channel bottom is always above the local water table.

Epicenter The point on the earth's surface that is directly above the focus of an earthquake.

Erosion The general process or processes whereby rock material is loosened, dissolved, or worn away, and simultaneously moved from one place to another by natural agents.

Fault Fracture in the earth's crust accompanied by displacement of one side of the fracture with respect to the other and in a direction parallel to the fracture.

Fault trace The surface expression of a fault plane.

Flood plain A strip of relatively flat land bordering a stream, built of sediment that was carried by the stream and dropped in the slack water beyond the influence of the swiftest current. A water flood plain is overflowed during times of high waters; a fossil flood plain is beyond the reach of the highest flood.

Fluvial Of, or pertaining to, rivers; produced by river action; e.g., fluvial sediments.

Forb A non-grass herb.

Form The mass or shape of an object or objects that appears unified, such as in the shape of the land surface, as used in BLM VRM System.

Formation The primary unit of geologic mapping; a set of rocks that share some distinctive feature of lithology. A group consists of two or more formations; a member is a division of a formation.

Geologic unit A recognizable rock unit based either on its lithologic (mappable) or its time-stratigraphic characteristics; a discrete body of rock recognizable by unique characteristics.

Geomorphic Pertaining to the form of the earth or its surface features.

Harassment Increased human activity in an area that intentionally or unintentionally disturbs and prompts livestock and/or wildlife to change their normal use of the area. Noise generated by heavy equipment, vehicular traffic on roads as well as ORV traffic in an area, incidence of poaching, and hunting activity are examples of what constitutes harassment.

Holocene An epoch of the Quaternary period of geologic time. It began about 8 thousand years ago and extends to the present.

Infrastructure The underlying foundation or basic framework of the social organization; i.e., businesses, government, police and fire departments, public service agencies, etc.

Intermittent stream A stream or reach of a stream that drains a watershed of at least 1 square mile, or stream or reach of a stream that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and ground water discharge.

Invertebrate Animals without a notochord or backbone.

Lacustrine Produced by or belonging to lakes, e.g., lacustrine sediments.

Lambing areas Those rangeland sites used primarily by domestic ewes when giving birth to their offspring.

Line The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture. Within the landscape, lines may be found on ridges, skylines, structures, changes in vegetation types or individual trees and branches. Line is one of the four elements used to determine contrast in the BLM VRM system.

Liquid hydrocarbons Substances composed of hydrogen and carbon atoms that are in a liquid state by natural occurrence or by artificial manipulations such as changes in pressure and/or temperature.

Lithology The physical character of a rock; the study and description of rocks.

Microearthquake Magnitude 2.0 or less. This size event cannot be felt. They are recorded by instruments.

Morphology The external structure, form, and arrangement of rocks in relation to the development of landforms.

National Ambient Air Quality Standards (NAAQS) EPA promulgated primary and secondary NAAQS (Federal Register 1971) on April 30, 1971. The primary standards were established to protect human health; the secondary standards were established to protect the public welfare from known or anticipated adverse effects. Currently NAAQS exist for total suspended particulates, sulfur dioxide, carbon monoxide, photochemical oxidants, and nitrogen oxides.

Natural gas A mixture of gaseous hydrocarbons found in conjunction with deposits of petroleum to which the gaseous compounds are closely related.

Natural gas liquids Those liquid hydrocarbon mixtures that are gaseous in reservoirs but are recovered by condensation or absorption; i.e., butane, ethane, iso-butane, natural gasoline, and propane.

Nesting concentration areas The 2-mile radius around a sage grouse strutting ground.

Nitrogen dioxide A molecule of one nitrogen and two oxygen atoms: NO_2 .

Overthrust Belt A term used to describe an intensely faulted belt of mountain ranges that extends from northwestern Canada to southern Utah. The thrust faults referred to are low-angle ruptures in the earth's crust that relieved deep compressional forces. These faults have repeatedly stacked the rock units. The surface expression of this tectonic activity is westward-dipping formations exposed in numerous ridges or mountain ranges. Each ridge moved horizontally and vertically to its position along at least one thrust fault.

Paleontology The science that deals with the life of past geological ages, based on the study of the fossil remains of plants and animals.

Paludal Pertaining to swamps or marshes.

Participation days The number of days a person would participate in a specified recreation activity annually.

Particulate matter Any material, except water in a chemically uncombined form, that is or has been airborne and exists as a liquid or a solid at standard temperature and pressure conditions. Minute particles of coal dust, fly ash, and oxides temporarily suspended in the atmosphere.

Perennial plant A species of plant that lives more than 1 year.

Perennial stream A stream or part of a stream that flows continuously during all of the calendar year as a result of ground-water discharge or surface runoff. The term does not include Intermittent Stream or Ephemeral Stream.

Prehistory The time before written history.

Prevention of Significant Deterioration (PSD) Specific requirements contained in the Clean Air Act Amendments of 1977, and in the subsequent PSD regulations promulgated by the EPA. The requirements and regulations are designed to protect the air quality resource in regions of the country where present pollutant levels are below the national ambient air quality standards.

Public lands Public domain administered by the Bureau of Land Management for the purpose of providing a wide variety of uses and resources to public users, including forage, wood products, minerals, open space, protection of cultural resources, recreation resources, and wilderness.

Quaternary A period of geologic time following the Tertiary. It began 2-3 million years ago and extends to the present.

Rangeland Land undisturbed by cultivation capable of growing native and adapted plant species for the purpose of domestic livestock grazing.

Raptor Predatory bird, such as the eagle, hawk, or owl.

Scenic quality The degree of variety within a landscape, measured as distinctive, common, or minimal. The measurement of scenic quality is based on the premise that landscapes with the most variety or diversity have the greatest potential for high scenic value, as used in BLM VRM System.

Seen-Area The perspective of the visual resource that is within clear viewing distance of public use areas (roadways, recreation sites).

Slope The degree of steepness of a hillside.

Sour gas Natural gas that contains objectionable amounts of hydrogen sulfide and other sulfur compounds.

Stabilized liquid hydrocarbons Those hydrocarbons that remain after methane, ethane, propane, and sometimes butane, hydrocarbons have been removed from the natural gas. Stabilized liquid hydrocarbons are heavier than butane and propane, and they can be stored and handled in a liquid state under normal conditions (they do not require refrigeration and/or pressurization).

Stratigraphy The branch of geology that deals with the formation, composition, sequence, and correlation of stratified rocks.

Strutting ground A specific geographic area where a group of male sage grouse perform courtship displays in the presence of a group of females. Strutting grounds are typically used many years in succession.

Substrate The type of ground surface that supports plant growth (e.g., soil, rock).

Sulfur dioxide (SO₂) Heavy, pungent, toxic gas that is easily condensed to a colorless liquid, is used in making sulfuric acid, and is a major air pollutant, especially in industrial areas.

Sweet gas Natural gas that contains no objectionable amounts of hydrogen sulfide and other sulfur compounds.

Syncline A trough or basin-shaped fold in rocks.

Tertiary The first period of the Cenozoic era and before the Quaternary period. Thought to have covered the span of time between 65 and 3 to 2 million years ago.

Threatened species Any animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Total dissolved solids (TDS) An aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts and are dissolved in water. High TDS values can adversely affect humans, animals, and plants. TDS is often used as a measure of salinity.

Vegetation species composition A vegetation type measure that considers the plant species that comprise the type.

Vegetation type A unit of vegetation classification comprised of areas of vegetation with similar species composition, cover, and density.

Visitor day One visit to a site during a 12-hour period by an individual person (not activity-specific).

Appendix A

PROJECTS CONSIDERED IN THE CUMULATIVE ANALYSIS

Table A-1. PROJECTS INCLUDED FOR ANALYSIS OF CUMULATIVE IMPACTS

Project Name	Project	Company	Approximate Location	County	Proposed Time Schedule	
					Initial Construction	Initial Production/Completion
U.S. 189	Upgrading U.S. 189	WY State Highway Dept.	10.4 mi south of Kemmerer (MP 24.0 to MP 34.4)	Lincoln	1982	1983
			MP 18.4 to MP 24.0		1984	1984
			MP 18.4 to MP 10.0		1985	1985
			MP 10.0 to MP 0.0		1986	1986
Opal Gasoline Plant	Expand plant capacity	Northwest Pipeline	Opal	Lincoln	April 1983	September 1983
Frontier Pipeline	Construct crude oil and condensate pipeline	Frontier Pipeline Company	Northeast Utah to Casper, Wyoming	Summit County, UT Uinta, Sweetwater, Fremont, and Natrona County, WY	May 1983	November 1983
Skull Point Coal Mine	Expanding production	Foods Machinery Corporation	T20N, R117W	Lincoln	July 1983	January 1984
South Haystack Mine	Develop coal mine	Cumberland Coal Company	T11N, R117W	Lincoln	January 1984	January 1986

Table A-1. PROJECTS INCLUDED FOR ANALYSIS OF CUMULATIVE IMPACTS (concluded)

Project Name	Project	Company	Approximate Location	County	Proposed Time Schedule		
					Initial Construction	Initial Production/Completion	
Craven Creek Plant	Develop sour gas processing plant	Northwest Pipeline	T22N, R113W	Lincoln	July 1984	June 1987	
Anschutz Ranch East	Develop sweet gas processing plant and ancillary facilities	Amoco Production Company	Southwestern Wyoming, North-eastern Utah	Uinta	1981	1989	
Cave Creek Sour Gas Gathering System	Construct sour gas gathering system	Amoco Production Company	Northeast Utah to Southwestern Wyoming	Summit and Rich counties, Utah, and Uinta County, Wyoming	1984	1984	

Sources: Buell 1982; Vandel 1982; Corra 1982; Johnson 1982; Stark 1982; Engelmann 1982; Hafner 1982; BLM 1982a,b.



Appendix B
GEOLOGY

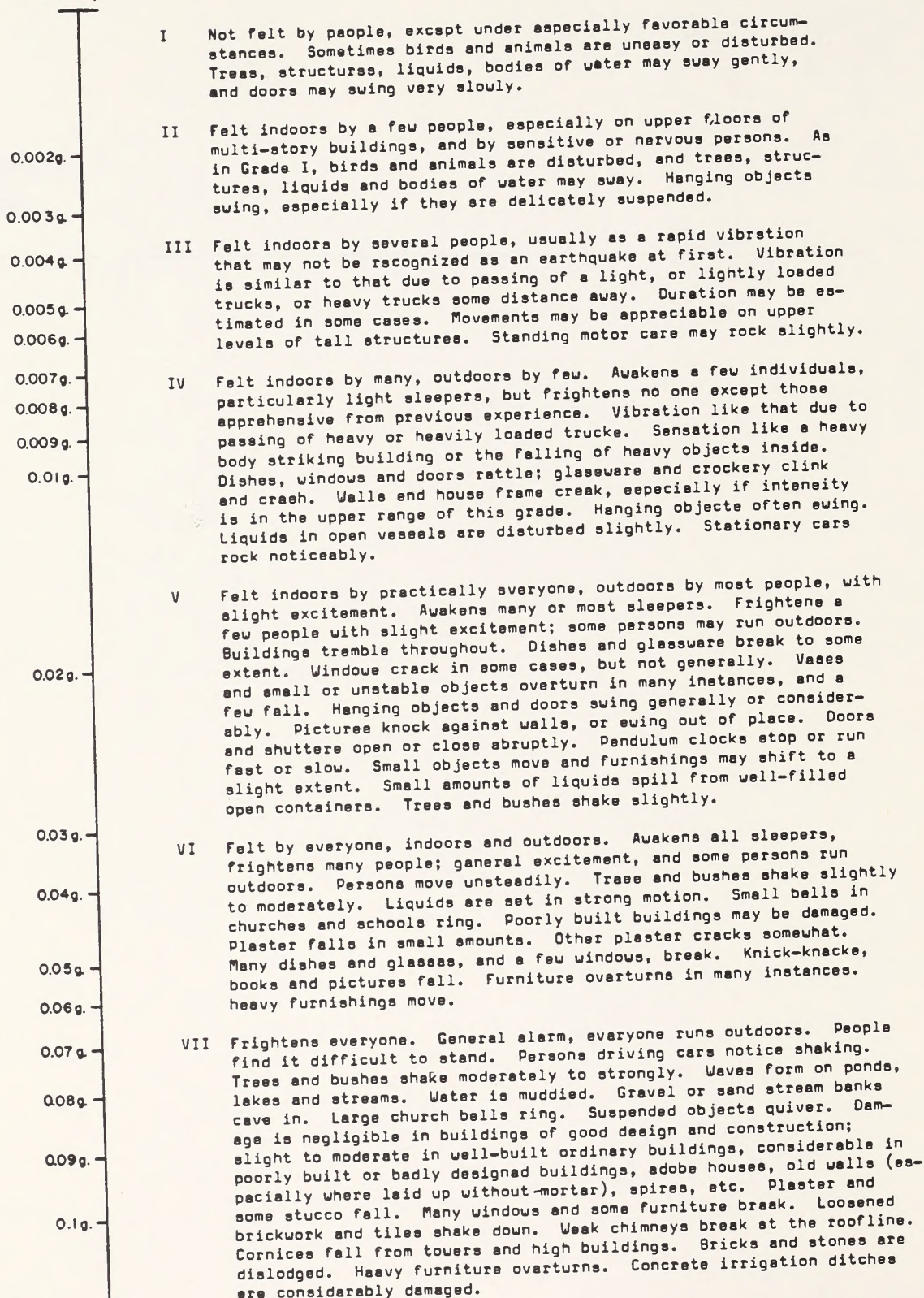
MODIFIED MERCALLI SCALE OF EARTHQUAKE INTENSITY

1931

(BASED ON OBSERVER'S REFERENCE TO SCALE OF "EFFECTS")

Approximate
Ground Acceleration

$$a/g = \frac{\text{Acceleration}}{\text{Gravity}}$$



0.2g	VIII	General fright and alarm approaches panic. Persons driving cars are disturbed. Trees shake strongly and branches and trunks break off (especially palm trees). Sand and mud erupts in small amounts. Flow of springs and wells is temporarily and sometimes permanently changed. Dry wells renew flow. Temperature of spring and well waters varies. Damage slight in brick structures built especially to withstand earthquakes; considerable in ordinary substantial buildings with some partial collapse; heavy in some wooden houses with some tumbling down. Panel walls break away in frame structures. Decayed pilings break off. Walls fall. Solid stone walls crack and break seriously. Wet ground and steep slopes crack to some extent. Chimneys, columns, monuments, and factory stacks and towers tilt and fall. Very heavy furniture moves conspicuously or overturns.
0.3g		
0.4g	IX	Panic is general. Ground cracks conspicuously. Damage is considerable in masonry structures built especially to withstand earthquakes; great in other masonry buildings, some collapse in large part. Some wood frame houses built especially to withstand earthquakes are thrown out of plumb, others are shifted wholly off foundations. Reservoirs are seriously damaged, and underground pipes sometimes break.
0.5g		
0.6g	X	Panic is general. Ground, especially when loose and wet, cracks up to widths of several inches; fissures up to a yard in width run parallel to canal and stream banks. Landsliding is considerable from river banks and steep coasts. Sand and mud shifts horizontally on beaches and flat land. Water level changes in wells. Water is thrown on banks of canals, lakes, rivers, etc. Dams, dikes, embankments are seriously damaged. Well-built wooden structures and bridges are severely damaged and some collapse. Dangerous cracks develop in excellent brick walls. Most masonry and frame structures and their foundations are destroyed. Railroad rails bend slightly. Pipe lines buried in earth, tear apart or are crushed endwise. Open cracks and broad wavy folds open in cement pavements and asphalt road surfaces.
0.7g		
0.8g		
0.9g		
1.0g		
2.0g	XI	Panic is general. Disturbances in ground are many and widespread, varying with the ground material. Broad fissures, earth slumps, and landslides develop in soft wet ground. Water charged with sand and mud is ejected in large amounts. Sea waves of significant magnitude may develop. Damage is severe to wood frame structures especially near shock centers; great to dams, dikes and embankments, even at long distances. Few if any masonry structures remain standing. Supporting piers or pillars of large well-built bridges are wrecked. Wooden bridges that "give" are less affected. Railroad rails bend greatly and some thrust endwise. Pipe lines buried in earth are put completely out of service.
3.0g		
4.0g	XII	Panic is general. Damage is total and practically all works of construction are damaged greatly or destroyed. Disturbances in the ground are great and varied and numerous shearing racks develop. Landslides, rock falls, and slumps in river banks are numerous and extensive. Large rock masses are wrenched loose and torn off. Fault slips develop in firm rock and horizontal and vertical offset displacements are notable. Water channels, both surface and underground, are disturbed and modified greatly. Lakes are dammed, new waterfalls are produced, rivers are deflected, etc. Surface waves are seen on ground surfaces. Lines of sight and level are distorted. Objects are thrown upward into the air.

C-1

Table C-1. SOIL TYPES (SUBGROUPS) IDENTIFIED ALONG/WITHIN THE
PROPOSED PROJECT COMPONENTS

Milepost or Acreage	County	Map Symbol	Soil Type
<u>Plant Site</u>			
40	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #4</u>			
0.0 - 0.7	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #7</u>			
0.0 - 1.9	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #8</u>			
0.0 - 0.3	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #9</u>			
0.0 - 1.8	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #10</u>			
0.0 - 2.0	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #11</u>			
0.0 - 1.3	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Gas Gathering Pipeline for Well #12</u>			
0.0 - 1.2	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop

Table C-1. SOIL TYPES (SUBGROUPS) IDENTIFIED ALONG/WITHIN THE
PROPOSED PROJECT COMPONENTS (continued)

Milepost or Acreage	County	Map Symbol	Soil Type
<u>Gas Gathering Pipeline for Well #13</u>			
0.0 - 1.8	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Sales Gas Pipeline to Carter Creek</u>			
0.0 - 7.1	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
7.1 - 7.8	Uinta	F3	Typic Cryorthents-Lithic Cryorthents-Borollic Camborthids-Rock Outcrop
<u>NGL and Condensate Pipelines to Ryckman Creek</u>			
0.0 - 7.1	Refer to "Proposed Sales Gas Pipeline to Carter Creek"		
7.1 - 20.8	Uinta	F3	Typic Cryorthents-Lithic Cryorthents-Borollic Camborthids-Rock Outcrop
<u>Transmission Line</u>			
0.0 - 2.0	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Eastern Access and Sulfur Haul Road</u>			
0.0 - 18.25	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
18.25 - 22.5	Lincoln	F1	Ustic Torriorthents- Lithic Ustic Torriorthents- Ustertic Torriorthents- Rock Outcrop

Sources: Lincoln County -- SCS 1981a.
 Uinta County -- SCS 1981b.

Table C-2. SOIL TYPES (SUBGROUPS) IDENTIFIED ALONG THE ALTERNATIVE PROJECT COMPONENTS

Milepost or Acreage	County	Map Symbol	Soil Type
<u>Alternative Gas Gathering Pipeline for Well #7</u>			
0.0 - 2.0	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Alternative Gas Gathering Pipeline for Well #8</u>			
0.0 - 0.4	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Alternative Gas Gathering Pipeline for Well #9</u>			
0.0 - 2.4	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Alternative Gas Gathering Pipeline for Well #10</u>			
0.0 - 4.6	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
<u>Alternative Sales Gas Pipeline to Whitney Canyon</u>			
0.0 - 17.1	Refer to "Proposed NGL and Condensate Pipelines to Ryckman Creek" in Table C-1.		
17.1 - 17.5	Uinta	F3	Typic Cryorthents-Lithic Cryorthents-Borollic Camborthids-Rock Outcrop
<u>Alternative Sales Gas Pipeline to NW-Kemmerer Compressor Station</u>			
0.0 - 17.25	Lincoln	F7	Typic Cryorthents-Lithic Cryorthents-Typic Cryoborolls-Rock Outcrop
17.25 - 17.5	Lincoln	V4	Ustic Torriorthents- Typic Torrifluvents- Borollic Natrargids- Xeric Torriorthents

Table C-2. (concluded)

Milepost or Acreage	County	Map Symbol	Soil Type
<u>Alternative Condensate/NGL Pipelines to Divide Junction second module)</u>			
0.0 - 19.5	Refer to "Proposed NGL and Condensate Pipelines to Ryckman Creek" in Table C-1.		
<u>Alternative Condensate/NGL Pipelines to Divide Junction</u>			
19.5 - 28.0	Uinta	F3	Typic Cryorthents- Lithic Cryorthents- Borollic Camborthids- Rock Outcrop
28.0 - 29.0	Uinta	F4	Ustic Torriorthents- Borollic Camborthids- Typic Cryoborolls- Typic Cryorthents
29.0 - 33.8	Uinta	F3	Typic Cryorthents- Lithic Cryorthents- Borollic Camborthids- Rock Outcrop
<u>Alternative Water Pipeline from Carter Creek</u>			
0.0 - 7.8	Refer to "Proposed Sales Gas Pipeline to Carter Creek" in Table C-1.		
<u>Alternative Transmission Line from Carter Creek</u>			
0.0 - 7.2	Lincoln	F7	Typic Cryorthents- Lithic Cryorthents- Typic Cryoborolls- Rock Outcrop
7.2 - 7.4	Uinta	F4	Ustic Torriorthents- Borollic Camborthids- Typic Cryoborolls- Typic Cryorthents
<u>Alternative Access and Sulfur Haul Road</u>			
0.0 - 7.4	Refer to "Alternative Transmission Line from Carter Creek."		

Sources: Lincoln County -- SCS 1981a.
 Uinta County -- SCS 1981b.

Table C-3. INTERPRETATIONS OF SOIL PROPERTIES FOR THE SOILS IDENTIFIED ALONG THE PROPOSED ACTION AND ALTERNATIVES

Map Symbol	Soil Association Name, Components, Subgroup, and Family	Representative Series	Slope Range (percent)	Surface ¹ Texture	Depth to Bedrock (inches)	Depth to Water Table (inches)	Perme- ² ability	Erodibility "K" ³ Factor	WEG Class ⁴	Hydro- logic Group ⁵
<u>All Proposed and Alternative Project Components That Would Require Soils Disturbance During Construction (except MP 18.5-22.5 of the Proposed Eastern Access and Sulfur Haul Road)</u>										
MC-8	Cryoborolls—Cryorthents association									
	Lithic Cryoborolls—loamy-skeletal	Starley	20-60	M	10-20	>60	M	.24	6	D
	Typic Cryoborolls—loamy-skeletal	Farlow	20-50	M	40-60	>60	M	.28	8	B
	Argic Cryoborolls—loamy-skeletal	Nathrop	6-60	M	20-40	>60	M	.28	6	B
	Argic Cryoborolls—fine	Owen Creek	2-20	M	20-40	>60	S	.37	6	C
	Lithic Cryorthents—loamy-skeletal	Fossilon	5-60	F	10-20	>60	S	.28	4L	D
	Typic Cryorthents—loamy, shallow	Prow	5-60	F	10-20	>60	M	.37	4L	D
	Typic Cryorthents—clayey, shallow	Oundick	6-60	F	10-20	>60	S	.37	4	D
	Typic Cryorthents—fine-loamy	—	6-60	M	>60	>60	M	.37	4L	B
	Typic Cryorthents—fine	—	6-60	F	>60	>60	S	.37	4	C
<u>Proposed Eastern Access and Sulfur Haul Road (MP 18.5-22.5)</u>										
BF-6	Torriorthents, alkali association									
	Ustertic Torriorthents—fine	Elko1	0-6	F	>60	>60	S	.32	4	D

Note: The soil interpretations in this table are generally representative of the soil series that are listed. This information is meant to be used for general planning purposes and does not necessarily reflect the actual soil conditions present along/within the proposed and alternative project components.

Source: SCS and University of Wyoming, Laramie 1977.

¹M = medium texture; F = fine texture.

²S = slow; M = moderate.

³For this analysis, water erosion susceptibility based on "K" factor values where: <.2 = low, .2-.39 = moderate, and ≥ .4 = high.

⁴For this analysis, wind erosion susceptibility is based on WEG classes where: Classes 7-8 = slight, 4-6 = moderate, and 1-3 = high.

⁵B = moderately low runoff potential, C = moderately high runoff potential, D = high runoff potential.

Table C-4. SUSCEPTIBILITY TO SOIL EROSION IF VEGETATIVE COVER IS REMOVED - PROPOSED ACTION

Milepost or Acreage	Miles	Level of Erosion Susceptibility ^a			
		Stable	Slight	Moderate	Critical
<u>Plant Site</u>					
40					X
<u>Gas Gathering Pipeline for Well #4</u>					
0.0 - 0.7	0.7				X
<u>Gas Gathering Pipeline for Well #7</u>					
0.0 - 1.9	1.9				X
<u>Gas Gathering Pipeline for Well #8</u>					
0.0 - 0.3	0.3				X
<u>Gas Gathering Pipeline for Well #9</u>					
0.0 - 1.8	1.8				X
<u>Gas Gathering Pipeline for Well #10</u>					
0.0 - 2.0	2.0				X
<u>Gas Gathering Pipeline for Well #11</u>					
0.0 - 1.3	1.3				X
<u>Gas Gathering Pipeline for Well #12</u>					
0.0 - 1.2	1.2				X
<u>Gas Gathering Pipeline for Well #13</u>					
0.0 - 1.8	1.8				X
<u>Sales Gas Pipeline to Carter Creek</u>					
0.0 - 3.0	3.0				X
3.0 - 4.25	1.25		X		

Table C-4. SUSCEPTIBILITY TO SOIL EROSION IF VEGETATIVE COVER IS REMOVED - PROPOSED ACTION (concluded)

Milepost or Acreage	Miles	<u>Level of Erosion Susceptibility^a</u>			
		Stable	Slight	Moderate	Critical
<u>Sales Gas Pipeline to Carter Creek (continued)</u>					
4.25 - 4.5	0.25				X
4.5 - 7.8	3.3		X		
<u>NGL and Condensate Pipelines to Ryckman Creek</u>					
0.0 - 7.1	Refer to "Proposed Sales Gas Pipeline to Carter Creek."				
7.1 - 16.25	9.15		X		
16.25 - 17.2	0.95				X
17.2 - 20.8	3.6		X		
<u>Transmission Line</u>					
0.0 - 1.8	Refer to "Proposed Gas Gathering Pipeline for Well #9."				
1.8 - 1.95	0.15				X
1.95 - 2.0	0.05		X		
<u>Eastern Access and Sulfur Haul Road</u>					
0.0 - 20.0	20.0				X
20.0 - 21.0	1.0	X			
21.0 - 22.5	1.5		X		

^aSource: BLM 1976.

Table C-5. SUSCEPTIBILITY TO SOIL EROSION IF VEGETATIVE COVER IS REMOVED - ALTERNATIVES

Milepost or Acreage	Miles	Level of Erosion Susceptibility ^a			
		Stable	Slight	Moderate	Critical
<u>Alternative Gas Gathering Pipeline for Well #7</u>					
0.0 - 2.0	2.0				X
<u>Alternative Gas Gathering Pipeline for Well #8</u>					
0.0 - 0.4	0.4				X
<u>Alternative Gas Gathering Pipeline for Well #9</u>					
0.0 - 1.75	1.75				X
1.75 - 2.3	0.55		X		
2.3 - 2.4	0.10				X
<u>Alternative Gas Gathering Pipeline for Well #10</u>					
0.0 - 4.6	4.6				X
<u>Alternative Sales Gas Pipeline to Whitney Canyon</u>					
0.0 - 17.1	Refer to "Proposed NGL and Condensate Pipelines to Ryckman Creek" in Table C-4.				
17.1 - 17.5	0.4				X
<u>Alternative Sales Gas Pipeline to NW - Kemmerer Compressor Station</u>					
0.0 - 6.0	6.0				X
6.0 - 8.75	2.75		X		
8.75 - 9.5	0.75				X
9.5 - 12.75	3.25		X		
12.75 - 13.0	0.25				X
13.0 - 16.5	3.5		X		
16.5 - 17.5	1.0				X
<u>Alternative Condensate/NGL Pipelines to Divide Junction</u>					
0.0 - 19.5	Refer to "Proposed NGL and Condensate Pipelines to Ryckman Creek" in Table C-4.				

Table C-5. SUSCEPTIBILITY TO SOIL EROSION IF VEGETATIVE COVER IS REMOVED - ALTERNATIVES (concluded)

Milepost or Acreage	Miles	Level of Erosion Susceptibility ^a			
		Stable	Slight	Moderate	Critical
<u>Alternative Condensate/NGL Pipelines to Divide Junction</u> (continued)					
19.5 - 20.75	1.25		X		
20.75 - 21.5	0.75			X	
21.5 - 22.25	0.75		X		
22.25 - 23.75	1.5			X	
23.75 - 24.25	0.5		X		
24.25 - 25.5	1.25	X			
25.5 - 26.25	0.75		X		
26.25 - 27.75	1.5			X	
27.75 - 33.8	6.05		X		
<u>Alternative Water Pipeline from Carter Creek</u>					
0.0 - 7.8	Refer to "Proposed Sales Gas Pipeline to Carter Creek" in Table C-4.				
<u>Alternative Transmission Line from Carter Creek</u>					
0.0 - 2.9	2.9				X
2.9 - 4.15	1.25	X			
4.15 - 4.4	0.25				X
4.4 - 7.4	3.0	X			
<u>Alternative Access and Sulfur Haul Road</u>					
0.0 - 7.4	Refer to "Alternative Transmission Line from Carter Creek."				

^aSource: BLM 1976.

Appendix D
VISUAL RESOURCES

VISUAL CONTRAST RATING VIEWSHEET 16.0d.

1. PROJECT INFORMATION

District Kollam

Planning Unit Kenneth R.H.
10/21/12

PLANT SITE

Location R118W/T12N

Step 3 VAM Class

DEC 15 1982 OREGON TRAIL

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Form MOUNTAINOUS TERRAIN, ROUNDED
DEPOSISED DRAINAGE AND LOW
LINE SOFT UNPLANNING AND LOW
OF DISTANT RANGES DOMINANT
COLOR SUBTLE, THIS TERRACE OF
CREAKS / ROUNDS, OF SHAPE
FINE

Texture FINE

Form Uniform Flat Scattering

AND DESERT CLASSES IN UPPER
LINE ROUNDED CLUSTERS OF ASPENS
ALONG PLANT EAST SWEEP AND IN
COLOR PLANT SITE FOREGROUND - LT
SAGE & GRASSES
Texture FINE UNIFORM TO MOTTLE

Texture FINE, UNIFORM TO MOTTLE

Form Both Carter Creek & Linton
Plants are visible in distance
Vertical stacks dominate
Geometric shapes innatural
Colors and pipelines contrast
with landscape

Color BLACK PIPELINES 1-01
DRAW CALIFORNIA WHITE RED CASE

Texture EXCAVATED SITE AND 'CLEAR' AREA HIGH CONTRAST WITH SURROUNDING

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced

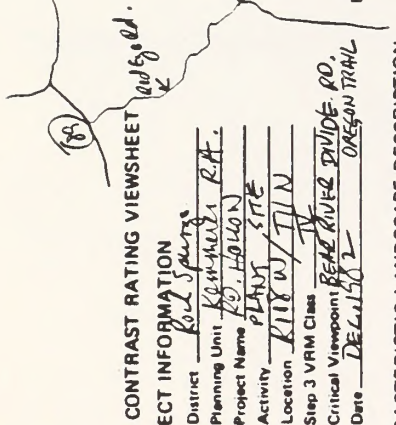
Form SITE CLEARED AND GRADED

Line HARD EDGE OF GRADED S/T
WITH NATURAL CONTOURS

Color EXPOSED SOILS TERRA-COTTA

Texture	SMOOTH	FINE	TEXTURE

3711831 2014, 4TH QTR



Form NO CONTRAST IN LOW PROFILE FORM

Line EDGE OF CLEARED SITE CREATES UNNATURAL
LINE - VISIBLE PRIMARILY FROM AERIAL PERSPECTIVE
Color CLEARED SITE HIGH CONTRAST OF EXPOSED
SOILS AGAINST DULL GREY - GREENS OF SURROUNDING
TERRACE CONTRAST IN MOTTLED APPEARANCE OF
NATURAL AREA FROM SITE CLEARING

Form INTRODUCTION OF VERTICAL GEOMETRIC FEATURES
TAKES UTILITY SUBSTATION / BUILDINGS EVAPORATION/INTRODUCTION
LINE STRONG VERTICAL FEATURES INTRODUCTION

Color LOW CONTRAST - NEUTRAL COLORS SPECIFIED
TANUS TERRA COTTA SAGE GREEN
TERRACE SMOOTH SURFACES OF PARKING AREAS,
NON-REFLECTANT STRUCTURES

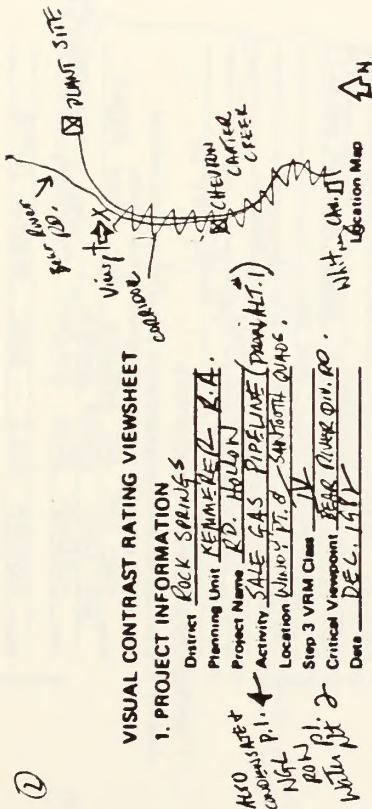
4. CONTRAST RATING () SHORT TERM (X) LONG TERM

Features	Land/Water	Vegetation	Structures		Maximum element contrast	
Degree of Contrast	Strong (3x)	Strong (3x)	Strong (3x)	None (0x)	0	
	Moderate (2x)	Moderate (2x)	Moderate (2x)	Weak (1x)	0	
	Weak (1x)	Weak (1x)	Weak (1x)	None (0x)	0	
	None (0x)	None (0x)	None (0x)	None (0x)	0	
Elements	Form (4x)	12	8	4	0	Maximum element contrast
	Line (3x)	9	6	3	0	Maximum feature contrast
	Color (2x)	6	4	2	0	Maximum feature contrast
	Texture (1x)	3	2	1	0	Maximum feature contrast
Total	19	18	19		20	

Does project design meet VRM requirements ☒ Yes ☐ No

EVALUATOR M. Duffly - Anniston Date 12-14-82
BEST VIEW OR ~~DATE~~ WILL BE FROM AERIAL PERSPECTIVE
PROJECT SITE HAS LOW SENSITIVITY BECAUSE
FORAGE USE IS PRIMARILY FOR HUNTING AND
ORV RECREATION. CUMULATIVE IMPACTS RESULT
FROM THIS PLANT IN COMBINATION WITH 2 OTHER
(CAMER Ck. & WHITNEY CANYON) ALONG ADDING TO RISK
OREGON TRAIL CROSSER PLANT SITE MONITORING IN
ONE OF THE WELL PRESERVED, DISTINGUISHABLE SECTORS

②



VISUAL CONTRAST RATING SHEET

1. PROJECT INFORMATION

District Rock Springs

Planning Unit KENNERLY R.A.

Project Name R.D. HOLLON

Activity SALE GAS PIPELINE (PUMPST. 1)

Location KIMBY PT. 8 SOUTHWEST QUAD.

Step 3 VRM Class IV

Critical Viewpoint BEAR RIVER DIV. RD.

Date DEC. 1982

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Form BACKGROUND ADJ. BEAR RIVER DIVIDE RIDGELINE

Line BACKGROUND + MIDDLE GROUND ROUNDED HILLS MOUNTAINS

Color UNDULATING AND ROUNDED RIDGELINES OF

Texture HILLS DOMINANT. DRAINAGES AND CREEK BEDS

Color SALE GREEN UNIFORM COLOR. SOILS TAN

Texture AND CLAYED

Form FINE

Form LOW PROFILE GRASSES AND SAFE BRUSH

Line UNIFORM PATTERNS ALONG RIDGELINE -

Color NILON AND COTTONWOOD IN DRAINAGE GULLIES

Texture SAFE GREEN DOMINANT + LT. TANS OF

Form FINE TO MOTTLED OF SAGE + GRASSES

Form CANYON CK. + WHITNEY CANYON PLANT

Line EAC. VISIBLE

Color EXISTING P.L. AND ROAD - CLEARED RON

Texture CLEARLY EVIDENT

Color EXPOSED SOIL COLOR DOMINANT - RED TAN

Form FINE TEXTURE OF SOILS

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified

refer to BLM manuals for proposed descriptions and requirements

Form UNDERGROUND PL.

Line EXISTING RON EXTENDED - GRADED DURING

Color CONSTRUCTION ACTIVITY

Texture NO CHANGE

Form ALL CHANGE

Form NO CHANGE

Line AD. CHANGE - PARALLEL EXISTING P.I. + ROAD

Color WIDER - RON CLEARED - ADDITIONAL CONTRASTS

Texture WITH SURROUNDING LANDSCAPE COLOR

Form FINE - CLEARED RON ADDITIVE LIN CONTRASTS

Texture WITH SURROUNDING GRASSES

Form NA

Line NA

Color NA

Texture NA

4. CONTRAST RATING (X) SHORT TERM () LONG TERM

Features	Land/Water			Vegetation			Structures		
	(3x)	(2x)	(1x)	(3x)	(2x)	(1x)	(3x)	(2x)	(1x)
Degree of Contrast	Form (4x)	12	8	4	0	12	8	4	0
	Line (3x)	9	6	3	0	9	6	3	0
	Color (2x)	6	4	2	0	6	4	2	0
	Texture (1x)	3	2	1	0	3	2	1	0
Total	3			5			0		

Maximum element contrast

Maximum feature contrast

Does project design meet VRM requirements (X) Yes () No

Evaluator M. Duffey-Armstrong

Date DEC. 1982

PROPOSED P.I. PARALLEL EXISTING RON RESULTS IN ADDITIONAL WIDTH OF VISIBLE CHANGES IN COLOR AND TEXTURE FROM CLEARING OF VEGETATION. CONTRASTS REDUCED IN LONG TERM FOLLOWING MITIGATION

3) KEMMER

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District ROCK SPRINGS
Planning Unit KENNEDY RA.
Project Name ROAD HOLLOW
Activity SHRUBS P.I. - ALT #2
Location SHRUBS P.I. - ALT #2
Step 3 VRM Class IV
Critical Viewpoint OREGON TRAIL
Date DEC. 1982

SET. 22

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

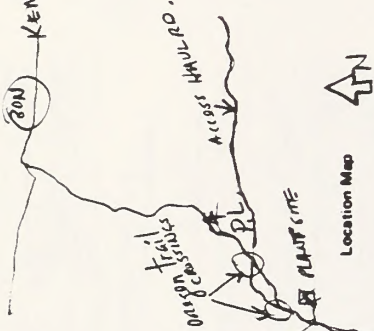
Form ROLLING HILLS, STEEP SLOPES; DRAINAGES
Line UNDULATING LINES OF RIDGELINES
Color SHRUB GREENS OF VEG. LITTLE SOIL EXPOSED
Texture RED - TERRA COTTA COLOR

Form LOW PROFILE GRASSES ALONG RIDGELINES;
Vegetation CLUSTERS OF NATIVE VEG. IN DRAINAGES
Line UNIFORM PATTERNS, LITTLE DEFINITION OF LINE
Color JAME GREEN ALONG RIDGELINES, DARKER GREENS
Texture IN DRAINAGES AND GULLIES

Form EXISTING 2-TRACK RD. ALONG SOUTHERN PORTION -
Structures OF RGN.
Color
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manual for proposed descriptions and requirements
Form SOME CUTS AND GRADING OVER SMALL RIDGES
Color AND ALONG STEEP SLOPES
Texture LINE CLEARED RUN EVIDENT FOLLOWING CONSTRUCTION
Color EXPOSED SOILS - REDS, TERRA COTTA
Texture FINE TEXT. OF EXPOSED SOILS



Form NO CHANGE
Line CLEARED RUN HIGH CONTRAST UNTIL RAKE-TAKES
Color EFFECT - UNNATURAL LINE
Texture SAME AS ABOVE - CLEARED RUN CONTRASTS
Form SAME AS ABOVE
Line NA
Color NA
Texture

4. CONTRAST RATING (X) SHORT TERM () LONG TERM

Features	Land/Water	Vegetation	Structures
Degree of Contrast	(1x) Weak (2x) Moderate (3x) Strong	(1x) Weak (2x) Moderate (3x) Strong	(1x) Weak (2x) Moderate (3x) Strong
Form (4x)	12	8	4
Line (3x)	9	6	3
Color (2x)	6	4	2
Texture (1x)	3	2	1
Total	14	18	0

Maximum element contrast —
Maximum feature contrast 20

Does project design meet VRM requirements (X) Yes () No

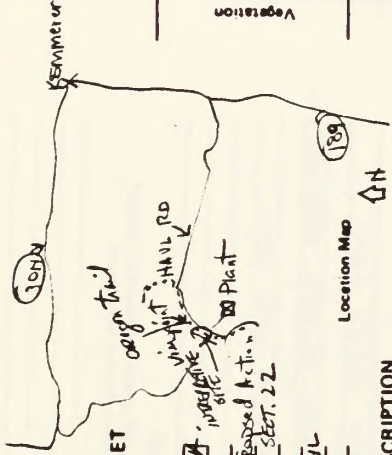
Evaluator M. D. H. - Armstrong Date DEC. 1982
FOLLOWS APPROVED RUN FOR QUARTERLY TRUNKLINE
CROSSES OREGON TRAIL IN TWO LOCATIONS (BELL
BUTTE QUAD - SECTION 22 + 28) BOTH TRAIL
SEGMENTS HAVE BEEN DISTURBED BY VEHICLE
TRAFFIC + HAVE LOW PRIORITY FOR PRESERVATION
(SEE AERC - CULTURAL REPORT)

④

VISUAL CONTRAST RATING SHEET

1. PROJECT INFORMATION

District Rock Strains
Planning Unit KEMMERER R.A.
Project Name K.D. HOLLOM
Activity DISSOLVING OF H₂S (FRESH ACTION)
Location BELLE BUTTE QUAD. SECT. 22
Step 3 VAM Class IV
Critical Viewpoint OREGON TRAIL
Date Dec. 1972



2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Form STEEP SLOPES, ROUNDED HILLS, DISTANT
Line VIEWS FROM RIDGE TOP
Color VEGET. COLOR DOMINATE
Texture FINE

3. PROPOSED ACTIVITY DESCRIPTION

Form EXISTING 2-TRACK ROAD PARALLEL
Line OREGON TRAIL CORRIDOR, FOLLIES
Color CUTS AND GRADING FOR ROAD DEVELOPMENT
Texture UNIFORM MOTTLED

4. CONTRAST RATING

Form LOW PROFILE SAFE AND GRASSES - CLUSTERS
Line UP PYNON JUNCTION
Color SAFE GREEN DOMINANT - DARKER
Texture UNIFORM MOTTLED

Form 1972

Line REMOVAL OF GRASSES AND SAFE WHERE
Color ROAD CLEARING OCCURS
Texture CLEARED ROW FOR ROAD CONSTRUCTION

Form 1972

Line PENCING FOR WILDLIFE PROTECTION CONTRASTS
Color WITH NATURAL SETTING
Texture 1972

4. CONTRAST RATING () SHORT TERM (X) LONG TERM

Features	Land/Water	Vegetation	Structures	Maximum element contrast
Degree of Contrast	Strong (3x)	Strong (3x)	Strong (3x)	None (0x)
Form (4x)	12	8	4	0
Line (3x)	9	6	3	0
Color (2x)	6	4	2	0
Texture (1x)	3	2	1	0
Total	17	18	6	20

Does project design meet VAM requirements () Yes () No

Evaluator A. Duff - Anthon Date Dec. 1972

EXHIBITION ALONG NORTH SIDE OF ROAD TO
MASK VIEW FROM OREGON TRAIL
INTERPRETIVE SITE WILL BE ADDED ALONG
RD. TO FOCUS VISITOR ATTENTION TO UNDISTURBED
PORTION OF TRAIL

5

VISUAL CONTRAST RATING SHEET

1. PROJECT INFORMATION

District ROCK SPRINGS
Planning Unit KEMMERER RA.
Project Name RD. HILTON
Activity TRANSMISSION LINE (PROPOSED)
Location PEAR RIVER ON BLVD.
Step 3 VRM Class TV
Critical Viewpoint OLEAN TRAIL
Date DEC. 1982



2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Form ROLLING HILLS IN BACKGROUND, STEEP SLOPES
Line TO DRAINAGE GULLIES
Color VEG. COLOR DOMINANT
Texture FINE

Form LOW PROFILE GRASSES AND SAGE BRUSH,
Line CLUSTERS OF JUNIPER IN DRAINAGES
Color SAGE GREEN DOMINANT, DARKER GREENS
Texture UNIFORM, MOTTLED

Form EXISTING WOOD POLE 138 KV LINE
Line EXISTING 138 KV LINE; EXISTING PEAR RIVER
Color GRAVEL RD., CONTRAST WITH VEG.
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manuals for proposed descriptions and requirements

Form
Line
Color
Texture

4. CONTRAST RATING () SHORT TERM (X) LONG TERM

Features	Land/Water	Vegetation	Structures
Degree of Contrast	(1x) Weak (2x) Moderate (3x) Strong	(1x) Weak (2x) Moderate (3x) Strong	(1x) Weak (2x) Moderate (3x) Strong
Form (4x)	12 8 4 0 12 8 4 0	0 12 8 4 0 12 8 4 0	0 12 8 4 0
Line (3x)	9 6 3 0 9 6 3 0	0 9 6 3 0 9 6 3 0	0 9 6 3 0
Color (2x)	6 4 2 0 6 4 2 0	0 6 4 2 0 6 4 2 0	0 6 4 2 0
Texture (1x)	3 2 1 0 3 2 1 0	0 3 2 1 0 3 2 1 0	0 3 2 1 0
Total	0	0	14

Maximum element contrast
Maximum feature contrast

Does project design meet VRM requirements (X) Yes () No

Evaluator M. Duffy-Arnsperg Date DEC 1982

substation and six miles of new T-line
would be visible from Olean trail -
sensitivity is reduced along this trail segment
because of the creek and whit. canyon
plant and existing 138 KV line and road
have already altered natural landscape.

Appendix E

RECREATION RESOURCES

Appendix E RECREATION

HUNTING

Hunting is one of the most popular activities within the study region. Significant big-game animals found within the western region of Wyoming are mule deer, antelope, elk, and moose. Popular big-game hunting areas include Dempsey Ridge, Bear River Divide, Fontenelle Basin, Lake Town Canyon, Big Creek, Woodruff Reservoir, and the national forests. Tables E-4 and E-5 show numbers of hunters, participation days, and harvest ratios for big game in activity areas directly affected by the proposed action. Other important wildlife generally found throughout western Wyoming are upland game and waterfowl, including blue grouse, Hungarian partridge, cottontail rabbits, red squirrels, ducks, and geese.

FISHING

Fishing opportunities are numerous within the national forests and on natural waterways in the study region. The areas that are used most extensively are the Snake and Green rivers; Fontenelle, Big Sandy, and Flaming Gorge reservoirs in Wyoming; and Bear Lake in Utah. In the immediate vicinity of Kemmerer, Viva Naughton Reservoir, Kemmerer Reservoir, and Hams Fork River (which is a blue-ribbon trout stream) offer fishing opportunities. Game fish found include brown trout, rainbow trout, cutthroat trout, whitefish, lake trout, golden trout, brook trout, greyling, and kokanee salmon.

BOATING AND SWIMMING

Opportunities for boating and swimming within the immediate vicinity of the proposed project are limited to Viva Naughton Reservoir. However, there are opportunities for water-based recreation within the 100-mile driving distance from potentially affected communities. Water-based recreation is generally confined to the region's major rivers, lakes, and reservoirs. Among the most frequently used water resources in the area are Flaming Gorge, Fontenelle, and Big Sandy reservoirs in Wyoming; and Willard Bay, Lost Creek Lake, Bear Lake, Hyrum Lake, East Canyon, and Rockport Lake state recreation areas in Utah. Boating and swimming opportunities are offered at all nine areas except Big Sandy Reservoir, which does not have swimming opportunities available. Float-boating (canoes, rafts, tubes, johnboats, etc.) is available on the Bear, Green, and Snake rivers.

CAMPING, PICNICKING, HIKING

Participation estimates for specific outdoor recreation activities by Wyoming residents for 1979 indicate that camping and picnicking had the largest percentage of population participation. Most camping and picnicking takes place in the cooler forested areas and near major water bodies in the region. There are approximately 3478 campsites available within the study area. Popular areas include Wasatch, Ashley, Bridger-Teton, and Caribou national forests; and all the

Table E-1. MAJOR RECREATION RESOURCES IN THE STUDY AREA

Recreation Resource	Managing Agency	Size (acres)	Location (County, State)
14 Mile Reservoir	BLM	70	Sweetwater, WY
Warren Bridge	BLM	20	Sublette, WY
Little Creek	BLM	1	Rich, UT
Birch Creek	BLM	1	Rich, UT
Big Creek	BLM	1	Rich, UT
Lake Town Canyon	BLM	N/A	Rich, UT
Woodruff Reservoir	BLM	N/A	Rich, UT
Dempsey Ridge	BLM	N/A	Lincoln, WY
Bear River Divide	BLM	N/A	Lincoln, WY Uinta, WY
Fontenelle Basin	BLM	N/A	Lincoln, WY Sublette, WY
Oregon Trail	BLM	N/A	WY
Fossil Butte National Monument	NPS	7438	Lincoln, WY
Wasatch Nat'l Forest	USFS	N/A	WY
Ashley Nat'l Forest	USFS	N/A	WY, UT
Bridger-Teton Nat'l Forest	USFS	N/A	WY
Caribou Nat'l Forest	USFS	N/A	ID
Flaming Gorge	USFS, WPRS	42,020	Sweetwater, WY Daggett, UT
Willow Lake	USFS	1,992	Sublette, WY
Halfmoon Lake	USFS	950	Sublette, WY

Table E-1. MAJOR RECREATION RESOURCES IN THE STUDY AREA (continued)

Recreation Resource	Managing Agency	Size (acres)	Location (County, State)
Fontenelle Reservoir	WPRS	8,744	Lincoln, WY
Big Sandy Reservoir	WPRS, WPC	2,498	Sweetwater, WY Sublette, WY
Willard Bay St. Rec. Area	UPR	2,673	Boxelder, UT
Lost Creek Lake St. Beach	UPR	693	Morgan, UT
Bear Lake St. Rec. Area	UPR	820	Rich, UT Bear Lake, ID
Hyrum Lake St. Rec. Area	UPR	258	Cache, UT
East Canyon St. Rec. Area	UPR	267	Morgan, UT
Rockport Lake St. Rec. Area	UPR	550	Summit, UT
Fort Bridger	WPC	37	Uinta, WY
Snake River	USFS	N/A	WY
Greys River	USFS	N/A	WY
Salt River	USFS	N/A	WY
Green River	BLM	N/A	Sweetwater, WY
Bear River	Private	N/A	Lincoln, WY Uinta, WY
New Fork River	BRW	N/A	Sublette, WY
Meadow Lake	USFS	N/A	Subletter, WY
Fremont Lake	USFS	6,000	Sublette, WY
Middle Piney Lake	USFS	142	Lincoln, WY

Table E-1. MAJOR RECREATION RESOURCES IN THE STUDY AREA (concluded)

Boulder Lake	USFS	N/A	Sublette, WY
Viva Naughton Reservoir	Private/ Utah Power & Light	1,375	Lincoln, WY
Kemmerer Reservoir	City of Kemmerer		Lincoln, WY
Woodruff Narrows Reservoir	Private	N/A	Uinta, WY

BLM = Bureau of Land Management
 USFS = United States Forest Service
 WPRS = Water and Power Resources Service
 WPC = Wyoming Park Commission
 UPR = Utah Division of Parks and Recreation
 BRW = Bureau of Reclamation Withdrawal

Table E-2. RURAL OUTDOOR RECREATION INVENTORY

Inventory	Region 7 Total	Counties			
		Lincoln	Sublette	Sweetwater	Uinta
<u>Recreation Acreage</u>					
U.S.F.S. - All	2,198,826	895,116	1,170,431	95,517	37,762
Wilderness	392,160	-	392,160	-	-
Primitive	53,000*	-	53,000*	-	-
N.P.S.	7,438	7,438	-	-	-
B.L.M.	7,335,048	1,015,989	1,265,493	4,514,791	538,775
B.O.R.	25,087	19,504	5,000	583	-
State Park	4,037	-	4,000	-	37.3
<u>Surface Water Acres</u>					
Alpine Lakes & Res.	26,646.5	412.3	25,712.2	-	522
Lowland Lakes & Res.	43,938.1	2,334.5	3,084.1	36,507	2,012.5
Farm Ponds	233.2	28.4	78.0	120.5	6.3
Total	70,817.8	2,775.2	28,874.3	36,627.5	2,540.8
<u>Stream Miles</u>					
Public	2,090	629	1,216	150.8	94.7
Private	1,344.1	383	646	82.4	232.7
Total	3,734.6	1,012	1,862	233.2	327.4
<u>Camping</u>					
Family Sites	1,207	376	347	328	156
Capacity	6,035	1,880	1,735	1,640	780
Group Sites	1	-	1	-	-
Capacity	100	-	100	-	-
<u>Picnicking</u>					
Family Sites	77	5	17 ^a	29	26
Capacity	1,732	67	85	1,450	130
<u>Swimming Sites</u>	6	3	1	2	-
<u>Boating Sites</u>	16	9	5	5	1
<u>Historical Areas</u>	20	4	5	7	4
<u>Ski Areas</u>					
No.	3	2	1	-	-
Capacity	300	50	250	-	-

Source: Wyoming Recreation Commission 1980.

*Estimated

^aIncludes 10 picnic tables counted at state parks some of which are used for camping.

Table E-3. ACTIVITY PARTICIPATION - DAY ESTIMATES FOR REGION 7*

Activity Participation	1979	1990
Picnicking	341,754	512,530
Visiting Historic Areas	70,849	110,943
Motorbikes	1,249	2,001
Camping	489,866	735,501
Hiking	56,705	87,672
Fishing	249,539	377,565
Power Boating	32,493	39,583
Canoeing/Sailing	254,802	398,034
Swimming	230,806	339,007
Waterskiing	52,881	87,879
Big-Game Hunting ¹	114,987	172,571
Small-Game Hunting ¹	76,556	110,446
Alpine Skiing ¹	56,008	91,803
Cross-Country Skiing ¹	35,715	59,956
Snowmobiles ¹	79,281	129,401

Source: Wyoming Recreation Commission 1980.

¹Does not include non-resident participation-days.

Table E-4. 1980 HUNTING STATISTICS

Big Game	Hunting Area	Licenses/ Permits	Number of Hunters	Hunter Success	Hunter Days	Days/ Harvest
Antelope	Bear River Divide	323	189	91.5	350	2.0
Mule Deer	Carter Lease	N/A	4407	44.3	11653	6.0
Elk	Carter Lease	N/A	334	0.0	920	0.0
Moose	Carter Lease	8	8	100.0		2.1

Source: Wyoming Game and Fish Department 1981 c.

Table E-5. 1981 HUNTING STATISTICS

Big Game	Hunting Area	Licenses/ Permits	Number of Hunters	Hunter Success	Hunter Days	Days/ Harvest
Antelope	Bear River Divide	359	237	88.2	444	2.1
Mule Deer	Carter Lease	N/A	2985	39.2	7049	6.0
Elk	Carter Lease	N/A	240	3.8	822	91.3
Moose	Carter Lease	10	10	100.0	26	2.6

Source: Wyoming Game and Fish Department 1982.

major water resources: Fontenelle, Flaming Gorge, and Big Sandy reservoirs; Willard Bay; Lost Creek Lake, Bear Lake, Hyrum Lake, East Canyon Lake, and Rockport Lake. Smaller recreation facilities offering camping and picnic sites, such as Warren Bridge, 14-Mile Reservoir, Little Creek, Birch Creek, Fort Bridger, and Hams Fork Campground are also used by local residents. Primitive camping associated with hunting and fishing activities also takes place on BLM lands and USFS lands. Popular areas on BLM lands for primitive camping, hunting, and fishing include Lake Town Canyon, and Big Creek.

Hiking is also a popular outdoor recreational activity in Wyoming. The Oregon National Historic Trail, set aside for recreation and historical use, traverses the Road Hollow property. There are five other historic trails in the area that provide recreation and educational opportunities. These include the Overland Trail, Sublette Cutoff, State Creek Cutoff, Dempsey Cutoff, and Hams Fork Cutoff (BLM 1979). The Cultural Resources section of this report further details the above historic trails.

SIGHTSEEING, HISTORICAL, INTERPRETIVE ACTIVITIES

Wildlife (including big game, small mammals, raptors, songbirds, waterfowl,

and game birds), historic sites (Fort Bridger), and trails (Oregon and Overland) are common sightseeing resources in the region. Fossil Butte National Monument, known for its concentration of fish fossils located along exposed strata, offers a resource of scientific and educational value. The Park Service has developed an interpretive trail for viewing the fossils.

ORV USE

Four-wheel-drive vehicles (ORVs) are used commonly in this region for both recreational and family vehicles. ORV use often occurs in conjunction with hunting, fishing, and sightseeing, or simply as recreational travel vehicles on overland trails and dirt tracks. ORVs and dirt bikes are reported to be popular in the Lyman, Wyoming, area.

WINTER SPORTS (SNOWMOBILING, CROSS-COUNTRY SKIING, NORDIC SKIING)

Commercial downhill ski resorts in the region are Eagle Rock, Pine Creek, and White Pine. Tubing, sledding, cross-country skiing, snowshoeing, and ice skating are possible throughout the study region on public lands.

Appendix F
WATER RESOURCES

Appendix F

WATER QUALITY INDEX

The three terms that were included in the index used for comparison of alternatives, including the proposed action, are: 1) the total acreage of disturbed area, DA; 2) the total length of the route in miles, L; and 3) the average distance in feet from the disturbed area to an identified drainage, DD. The index was constructed from these three terms as follows:

$$\text{Water Quality Index} = \frac{(DA)(L)}{DD}$$

The DA term was included in the numerator because the area of disturbance is directly related to the potential for downstream suspended solids increases and sedimentation, as well as to the need for

water for dust suppression during construction. The length was included in the numerator because the spill potential during construction and operation and the volume of hydrostatic test water used and discharged during pipeline pressure testing increases as the length of the linear component increases. The average distance from the disturbance to identified drainages (those marked on USGS 7.5-minute maps) was included in the denominator because it is assumed that increasing the distance between a disturbance and the receiving-stream decreases downstream transport of sediments and other contaminants. The average distance to identified drainages, DD, was determined by summing the distance between individual 0.2-mile-long route segments and the appropriate downstream drainage.

Appendix G
MAP G-1. DETAILED LOCATION MAP FOR PROPOSED
AND ALTERNATIVE PROJECT COMPONENTS

Form 1279-3
(June 1984)

BORROWER

TD 195 .63 R62 198

Road Hollow gas p
Project in Lincol

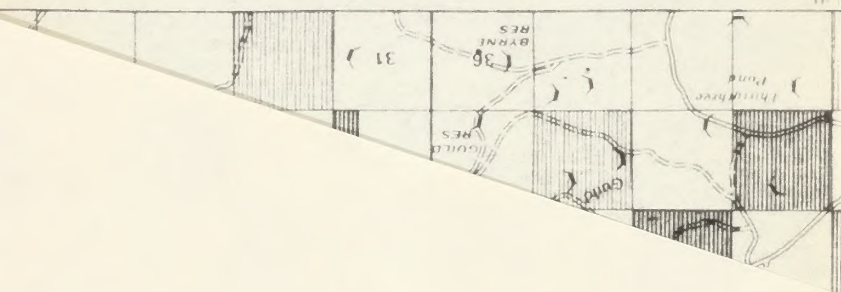
DATE
LOANED

BORROWER

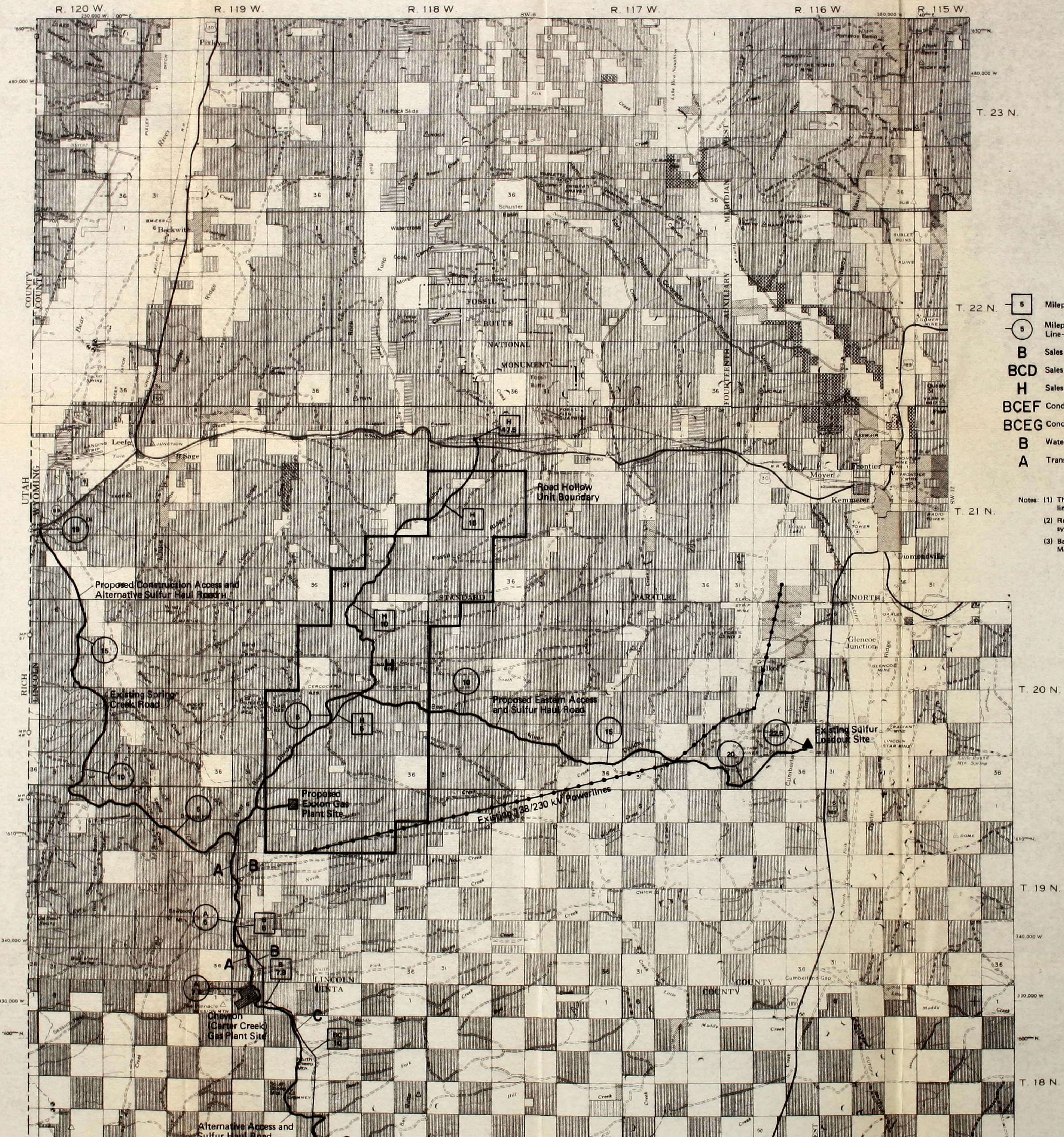
USDI - BLM

R. 118 W.

R. 117 W.



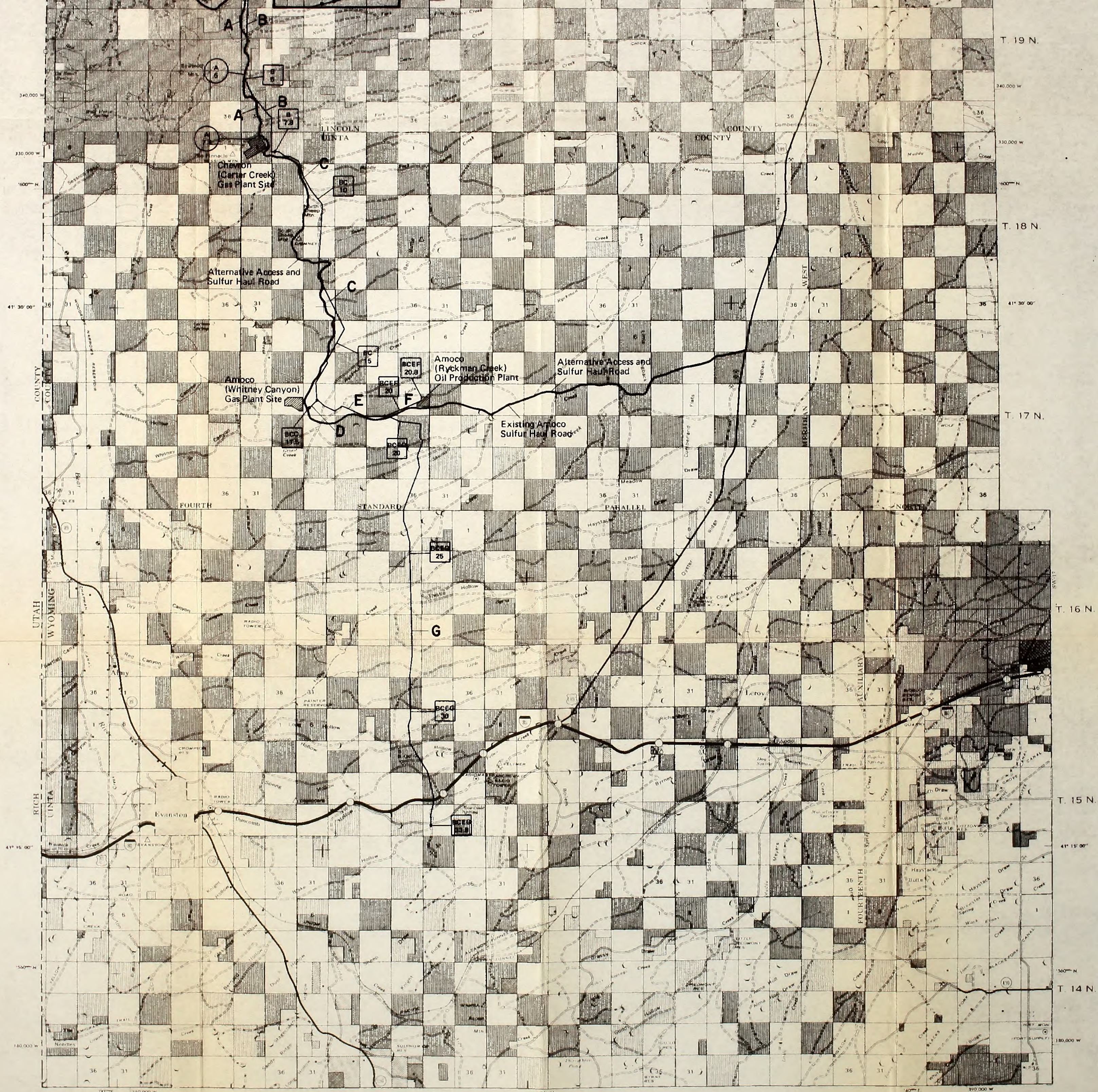
WYOMING



LEGEND

- 5 Milepost along Pipeline Routes
- 5 Milepost along Roads and Transmission Line—Alternative 1
- B** Sales Gas Pipeline—Proposed Action
- BCD** Sales Gas Pipeline—Alternative 1
- H** Sales Gas Pipeline—Alternative 2
- BCEF** Condensate and NGL Pipelines—Proposed Action
- BCEG** Condensate and NGL Pipelines—Alternative 1
- B** Water Supply Pipeline—Alternative 1
- A** Transmission Line—Alternative 1

Notes: (1) The proposed gas plant site is milepost 0 for all linear project components.
 (2) Refer to Map 1-3 for location of the gas gathering system and proposed transmission line.
 (3) Base map compiled from BLM Surface-Minerals Management Quads.



SCALE 1:126,720
1/4 INCH = 1 MILE SERIES

Map G-1. DETAILED LOCATION MAP FOR PROPOSED AND ALTERNATIVE PROJECT COMPONENTS

